

# State of Hawaii Annual Summary 2017 Air Quality Data



**Bruce S. Anderson, Ph.D.**  
Director of Health

State of Hawaii  
Department of Health  
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**David Y. Ige**  
Governor of Hawaii

# 2017

## Hawaii Air Quality Data

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# Section 1

## INTRODUCTION

The Department of Health, Clean Air Branch, monitors the ambient air in the State of Hawaii for various gaseous and particulate air pollutants. The U. S. Environmental Protection Agency (EPA) has set national ambient air quality standards (NAAQS) for six criteria pollutants: carbon monoxide, nitrogen dioxide, sulfur dioxide, lead, ozone, and particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>). Hawaii has also established a state ambient air standard for hydrogen sulfide. The primary purpose of the statewide monitoring network is to measure ambient air concentrations of these pollutants and ensure that these air quality standards are met. The stations are maintained and the data are collected by the Air Surveillance and Analysis Section of the State Laboratories Division.

In addition to monitoring the ambient air for criteria pollutants, the State of Hawaii also participates in the NCore multi pollutant monitoring network; the NCore station in Hawaii is located at the Kapolei monitoring station. The NCore network addresses the following objectives:

- Timely reporting of data to public by supporting AIRNow, air quality forecasting, and other public reporting mechanisms;
- Support for development of emission strategies through air quality model evaluation and other observational methods;
- Accountability of emission strategy progress through tracking long-term trends of criteria and non-criteria pollutants and their precursors;
- Support for long-term health assessments that contribute to ongoing reviews of the NAAQS;
- Compliance through establishing nonattainment/attainment areas through comparison with the NAAQS;
- Support to scientific studies ranging across technological, health, and atmospheric process disciplines;
- Support to ecosystem assessments recognizing that national air quality networks benefit ecosystem assessments and, in turn, benefit from data specifically designed to address ecosystem analyses; and
- PM<sub>2.5</sub> speciation monitoring that EPA determined to be essential for establishing a relationship between particle concentrations and adverse health effects and would provide valuable information in characterizing aerosols, determining the effectiveness of control strategies, and understanding the effects of particle pollution on atmospheric and regional haze.

Air pollution is caused by many different man-made and natural sources. There are industrial sources of pollution, such as power plants and refineries; mobile sources, such as cars, trucks, and buses; agricultural sources, such as agricultural burning; and natural sources, such as windblown dust and volcanic activity. In 2017, for the most part, the state maintained 14 air monitoring stations on 4 islands. Most commercial, industrial, and transportation activities and their associated air quality effects occur on Oahu, where 4 of

the stations are located. The monitoring stations on Maui are mainly to measure the air quality impacts from agricultural activities. The majority of stations are located on the island of Hawaii to measure air quality impacts from the volcano and geothermal energy production. The monitoring station on Kauai is mainly to measure the air quality impacts from cruise ships. The state's ambient air monitoring network is reviewed annually and relocations, additions and/or discontinuations can occur in the future as the need arises.

This report summarizes the validated air pollutant data collected at the 14 monitoring stations during calendar year 2017. Tabular summaries are provided which compare the measured concentrations of criteria pollutants with federal ambient air quality standards and of hydrogen sulfide with the state standard. The 2017 speciation data is also included in this report. Trend summaries of criteria pollutants parameters are shown graphically.

The Department of Health has a web site that displays near real-time air quality data updated throughout the day from the air monitoring stations. The data has not been reviewed for quality assurance and is subject to change but provides the public with viewing access to current air pollutant and meteorological information. To view this data online, go to <http://health.hawaii.gov/cab> and link to "Hawaii Ambient Air Quality Data."

Additionally, because emissions from the Kilauea volcano are affecting communities on the island of Hawaii on a daily basis, the Department of Health has a website dedicated to displaying short term SO<sub>2</sub> data from stations located on the island. It provides near real-time 15-minute SO<sub>2</sub> averages and advisory level guidance to help individuals protect themselves against possible health effects. To view this data online, go to [www.hiso2index.info](http://www.hiso2index.info)

To view this entire book as well as books from 2015 and 2016 online, go to: <http://health.hawaii.gov/cab> and link to "Hawaii Air Quality Data Book."

Questions or comments regarding data in this report and other air quality information should be addressed to:

Clean Air Branch	Phone: (808)586-4200
Department of Health	Fax: (808)586-4359
P.O. Box 3378	
Honolulu, Hawaii 96801-3378	

The Department of Health provides access to its programs and activities without regard to race, color, national origin (including language), age, sex, religion, or disability. Write our Affirmative Action Officer at P.O. Box 3378, Honolulu, Hawaii 96801-3378, or call (808)586-4616 (voice) within 180 days of a problem.

## Section 2

# DEFINITIONS

<i>98<sup>th</sup> Percentile Value</i>	The PM <sub>2.5</sub> 24-hour average or the maximum daily 1-hour NO <sub>2</sub> average in the year below which 98% of all values fall.
<i>99<sup>th</sup> Percentile Value</i>	The maximum daily 1-hour SO <sub>2</sub> value in the year below which 99% of all values fall.
<i>Ambient Air</i>	The general outdoor atmosphere, external to buildings, to which the general public has access.
<i>Ambient Air Quality Standard</i>	A limit in the quantity and exposure to pollutants dispersed or suspended in the ambient air. Primary standards are set to protect public health, including sensitive populations such as asthmatics, children, and the elderly. Secondary standards are set to protect public welfare including protection against visibility degradation, and damage to animals, crops, vegetation and buildings.
<i>Carbon Monoxide</i>	Carbon monoxide (CO) is a colorless, odorless, tasteless gas under atmospheric conditions. It is produced by the incomplete combustion of carbon fuels with the majority of emissions coming from transportation sources.
<i>CFR</i>	Code of Federal Regulations is the codification of the general and permanent rules published in the Federal Register by the executive departments and agencies of the Federal government. Title 40 is the Protection of the Environment.
<i>Collocated</i>	This is a procedure required for a certain percentage of PM <sub>10</sub> and PM <sub>2.5</sub> samplers in the monitoring network. Collocated samplers determine precision or variation in the PM <sub>10</sub> or PM <sub>2.5</sub> concentration measurements of identical samplers run in the same location under the same sampling conditions.
<i>Criteria Pollutants</i>	These are the six pollutants for which the EPA has established national air quality standards. The pollutants are ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, lead and particulate matter (PM <sub>10</sub> and PM <sub>2.5</sub> ).
<i>EPA</i>	The U. S. Environmental Protection Agency; established to protect human health and the natural environment.

<i>Hydrogen Sulfide</i>	Hydrogen sulfide (H <sub>2</sub> S) is a toxic, colorless gas with a characteristic “rotten egg” odor detectable at very low levels. It occurs naturally during the decomposition of organic matter, near geothermal sources and is also produced during certain industrial processes, including wastewater treatment facilities.
<i>Micron</i>	One micron is one millionth of a meter or approximately 1/25,000 of an inch.
<i>µg/m<sup>3</sup></i>	Micrograms per cubic meter. This is the measurement of air quality expressed as mass per unit volume.
<i>NAAQS</i>	National Ambient Air Quality Standards. These are pollutant standards that the EPA has established to protect public health and welfare. NAAQS have been set for carbon monoxide, nitrogen dioxide, PM <sub>10</sub> , PM <sub>2.5</sub> , ozone, sulfur dioxide, and lead. These are commonly referred to as criteria pollutants.
<i>NCore</i>	A multi-pollutant network that integrates several advanced measurement systems for particles, pollutant gases and meteorology. Most NCore stations have been operating since the formal start of the network on January 1, 2011, including Hawaii’s.
<i>Nitrogen Dioxide</i>	Nitrogen dioxide (NO <sub>2</sub> ) is a brownish, highly corrosive gas with a pungent odor. It is formed in the atmosphere from emissions of nitrogen oxides (NO <sub>x</sub> ). Sources of nitrogen oxides include electric utilities, industrial boilers, motor vehicle exhaust and combustion of fossil fuels. NO <sub>2</sub> is also a component in the atmospheric reaction that produces ground-level ozone.
<i>Ozone</i>	Ozone (O <sub>3</sub> ) is the main constituent in photochemical air pollution. It is formed in the atmosphere by a chemical reaction of nitrogen oxides (NO <sub>x</sub> ) and volatile organic compounds (VOCs) in the presence of sunlight. In the upper atmosphere, O <sub>3</sub> shields the earth from harmful ultraviolet radiation; however, at ground level, it can cause harmful effects in humans and plants.
<i>Particulate Matter</i>	This refers to any solid or liquid matter dispersed in the air. Particulate matter (PM) includes dust, soot, smoke, and liquid droplets from sources such as factories, power plants, motor vehicles, construction, agricultural activities, and fires.



<i>PM<sub>10</sub></i>	Particulate matter that is 10 microns or less in aerodynamic diameter. These are considered “coarse” particles, generally from sources such as road and windblown dust, and crushing and grinding operations.
<i>PM<sub>2.5</sub></i>	Particulate matter that is 2.5 microns or less in aerodynamic diameter. Considered “fine” particles, these are generally a result of fuel combustion such as from motor vehicles, utility generation and industrial facilities. Fine particles can also be formed when gases, such as sulfur dioxide and nitrogen dioxide, are chemically transformed into particles.
<i>ppm</i>	Parts per million is one particle in 1,000,000 other particles. It is approximately one drop in 13 gallons.
<i>SLAMS</i>	State and Local Air Monitoring Stations. The Clean Air Act requires that every state establish a network of air monitoring stations for criteria pollutants.
<i>SPM</i>	Special Purpose Monitoring stations. These are stations established to provide data for special studies in support of air program interests and activities. SPM stations supplement the SLAMS network as special circumstances require and adequate resources permit.
<i>Sulfur Dioxide</i>	Sulfur dioxide (SO <sub>2</sub> ) is a colorless gas that easily combines with water vapor forming sulfuric acid. Emissions of sulfur dioxide are largely from sources that burn fossil fuels such as coal and oil. In Hawaii, another major source of sulfur dioxide emissions is from the eruption of Kilauea Volcano on the Big Island.
<i>Vog</i>	Vog is a local term used to express volcanic smog. Vog occurs when volcanic gas and particles combine with air and sunlight to produce atmospheric haze.

## Table 2-1 State and Federal Ambient Air Quality Standards

Sources: State standards HAR §11-59; Federal standards 40 CFR Part 50

Air Pollutant	Averaging Time	Standards		
		Hawaii State Standard	Federal Primary Standard <sup>a</sup>	Federal Secondary Standard <sup>b</sup>
Carbon Monoxide (CO)	1-hour	9 ppm	35 ppm	None
	8-hour	4.4 ppm	9 ppm	
Nitrogen Dioxide (NO <sub>2</sub> )	1-hour	---	0.100 ppm	---
	Annual	0.04 ppm	0.053 ppm	0.053 ppm
PM <sub>10</sub>	24-hour	150 µg/m <sup>3</sup>	150 µg/m <sup>3</sup>	---
	Annual <sup>c</sup>	50 µg/m <sup>3</sup>	---	---
PM <sub>2.5</sub>	24-hour	---	35 µg/m <sup>3</sup>	35 µg/m <sup>3</sup>
	Annual		12 µg/m <sup>3</sup>	15 µg/m <sup>3</sup>
Ozone (O <sub>3</sub> )	8-hour	0.08 ppm	0.070 ppm	0.070 ppm
Sulfur Dioxide (SO <sub>2</sub> )	1-hour	---	0.075 ppm	---
	3-hour	0.5 ppm	---	0.5 ppm
	24-hour	0.14 ppm	---	---
	Annual	0.03 ppm	---	---
Lead (Pb)	Rolling 3-month	1.5 µg/m <sup>3</sup> <sup>d</sup>	0.15 µg/m <sup>3</sup>	0.15 µg/m <sup>3</sup>
Hydrogen Sulfide	1-hour	0.025 ppm	None	None

<sup>a</sup> **Primary Standards** set limits to protect public health, including the health of “sensitive” populations such as asthmatics, children and the elderly.

<sup>b</sup> **Secondary Standards** set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

<sup>c</sup> Due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution, EPA revoked the annual PM<sub>10</sub> standard effective December 17, 2006. However, the state still has an annual standard.

<sup>d</sup> The state standard is based on calendar quarter.

### Compliance with the National Ambient Air Quality Standards

**CO 1-hour:** May not be exceeded more than once per year.

**CO 8-hour:** May not be exceeded more than once per year.

**NO<sub>2</sub> 1-hour:** The 3-year average of the 98<sup>th</sup> percentile daily maximum 1-hour averages must not exceed the standard.

**NO<sub>2</sub> Annual:** Average of all 1-hour values in the year may not exceed the level of the standard.

**PM<sub>10</sub> 24-hour:** Must not be exceeded more than one day per year, after compensating for days when monitoring did not occur (estimated number of exceedances).

**PM<sub>2.5</sub> 24-hour:** The 3-year average of the 98<sup>th</sup> percentile 24-hour concentrations must not exceed the level of the standard.

**PM<sub>2.5</sub> Annual:** The 3-year average of 24-hour values must not exceed the level of the standard.

**Ozone 8-hour:** The 3-year average of the fourth highest daily maximum value must not exceed the level of the standard.

**SO<sub>2</sub> 1-hour:** The 3-year average of the 99<sup>th</sup> percentile daily maximum 1-hour averages must not exceed the standard.

**SO<sub>2</sub> 3-hour:** Not be exceeded more than once per year.

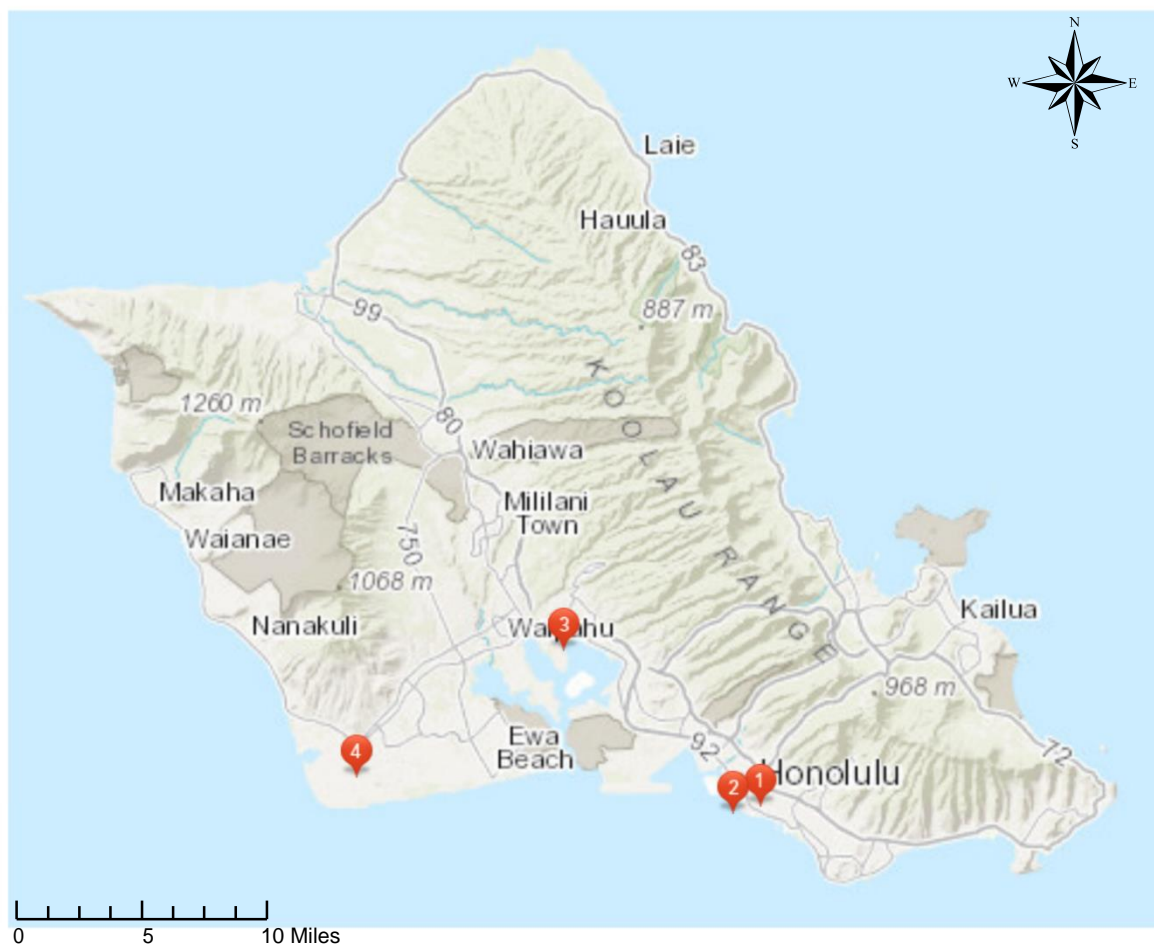
**SO<sub>2</sub> Annual:** Average of all 1-hour values in the year may not exceed the level of the standard.

**Lead:** Average of all 24-hour values in any rolling 3-month period may not exceed the level of the standard.

## Section 3


# SITE LOCATIONS AND DESCRIPTIONS


**Figure 3-1: Island of Oahu – Air Monitoring Stations**





Station	Name	Location	Pollutants/Parameters Monitored
1	Honolulu	1250 Punchbowl St.	CO, SO <sub>2</sub> , PM <sub>2.5</sub> , PM <sub>10</sub>
2	Sand Island	1039 Sand Island Pkwy.	O <sub>3</sub> , PM <sub>2.5</sub>
3	Pearl City	860 4 <sup>th</sup> St.	PM <sub>2.5</sub> , PM <sub>10</sub>
4	Kapolei	2052 Lauwiliwili St.	CO, SO <sub>2</sub> , NO <sub>2</sub>
	Kapolei NCore	2052 Lauwiliwili St.	CO trace, SO <sub>2</sub> trace, NO/NO <sub>y</sub> , Pb, O <sub>3</sub> , PM <sub>2.5</sub> , PM <sub>2.5</sub> speciation, PM <sub>10</sub> , PM <sub>10-2.5</sub> , WS/WD

The following station descriptions include latitude and longitude in decimal degrees and altitude in meters above mean sea level.

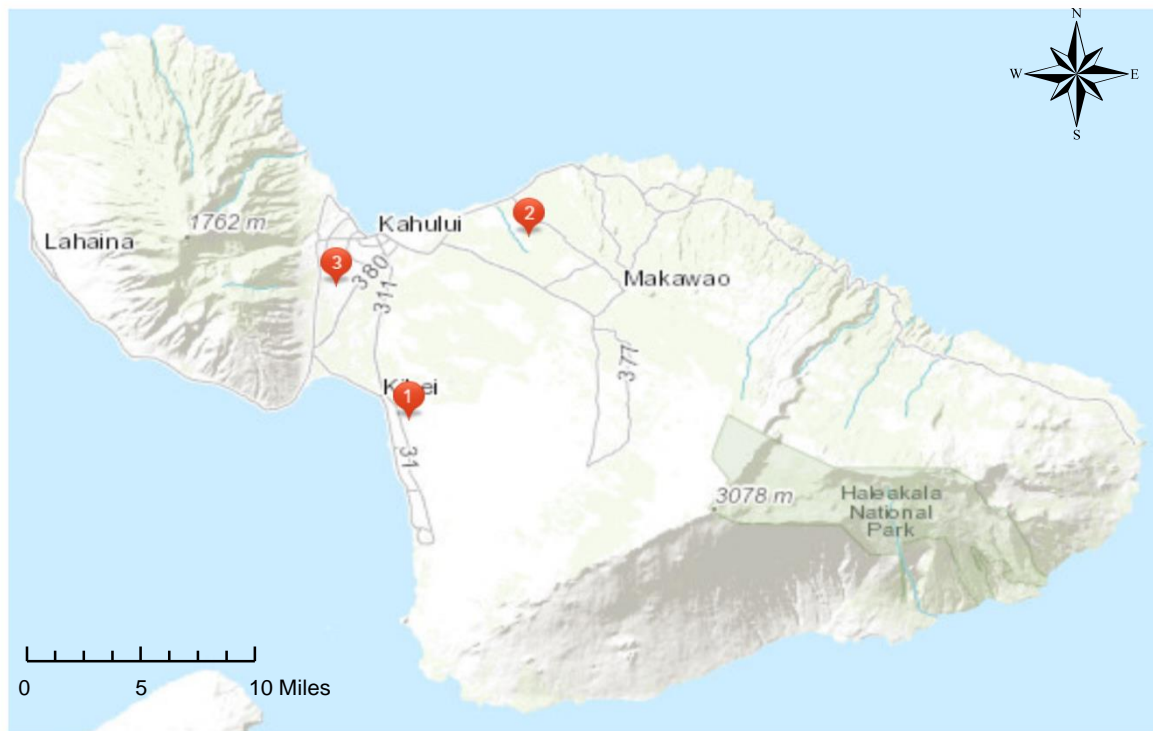
Honolulu (DH)		
	<b>Location:</b>	1250 Punchbowl St., Honolulu
	<b>Latitude:</b>	21.30758
	<b>Longitude:</b>	-157.85542
	<b>Altitude:</b>	20 m
	<b>Parameters:</b>	SO <sub>2</sub> , CO, PM <sub>10</sub> , PM <sub>2.5</sub>
	<b>Established:</b>	February 1971
	<b>Brief Description:</b>	Located in downtown Honolulu on the roof of the Department of Health building, across from the Queen's Medical Center, in a busy commercial, business and government district.

Kapolei (KA)		
	<b>Location:</b>	2052 Lauwiliwili St., Kapolei
	<b>Latitude:</b>	21.32374
	<b>Longitude:</b>	-158.08861
	<b>Altitude:</b>	17.9 m
	<b>Parameters:</b>	SO <sub>2</sub> , CO, NO <sub>2</sub> , PM <sub>10</sub> , PM <sub>2.5</sub> , PM <sub>2.5</sub> speciation, NCore
	<b>Established:</b>	July 2002
	<b>Brief Description:</b>	Located in Kapolei Business Park, southeast of Kapolei Fire Station, next to a drainage canal that separates the park from Barber's Point. Approximately 1.5 miles from Malakole Street in Campbell Industrial Park.

Pearl City (PC)		
	<b>Location:</b>	860 4 <sup>th</sup> St., Pearl City
	<b>Latitude:</b>	21.39283
	<b>Longitude:</b>	-157.96913
	<b>Altitude:</b>	23.1 m
	<b>Parameters:</b>	PM <sub>10</sub> , PM <sub>2.5</sub>
	<b>Established:</b>	May 1979
	<b>Brief Description:</b>	Located on the roof of the Leeward Health Center in a commercial, residential and light industrial area approximately 1.5 miles northwest of the Waiiau power plant and near the Pearl Harbor Naval Complex.


Sand Island (SI)		
	<b>Location:</b>	1039 Sand Island Pkwy., Honolulu
	<b>Latitude:</b>	21.30384
	<b>Longitude:</b>	-157.87117
	<b>Altitude:</b>	5.3 m
	<b>Parameters:</b>	O <sub>3</sub> , PM <sub>2.5</sub>
	<b>Established:</b>	February 1981
	<b>Brief Description:</b>	Located in a light industrial, commercial and recreational area approximately two miles downwind of downtown Honolulu near the entrance to the Sand Island State Recreation Area.


**Figure 3-2: Island of Maui – Air Monitoring Stations**




Station	Name	Location	Pollutants Monitored
1	Kihei	Hale Piilani Park	PM <sub>2.5</sub>
2	Paia	TMK (2)-2-5-005-05	PM <sub>2.5</sub>
3	Kahului	TMK (2)-3-8-007-153	PM <sub>2.5</sub>

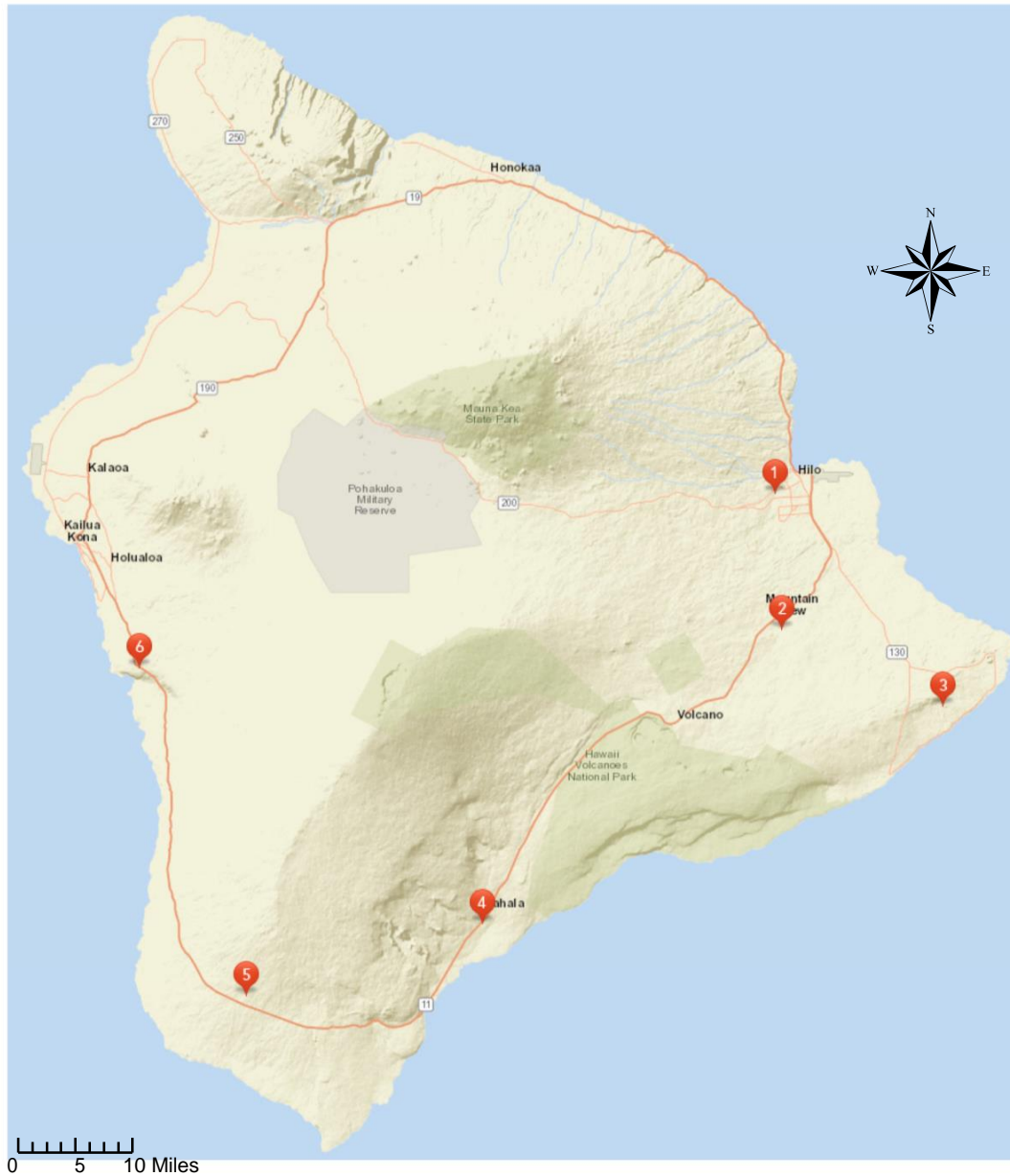


Kihei (KH)	
	<b>Location:</b> Hale Piilani Park, Kihei
	<b>Latitude:</b> 20.780997
	<b>Longitude:</b> -156.44637
	<b>Altitude:</b> 46.5 m
	<b>Parameters:</b> PM <sub>2.5</sub>
	<b>Established:</b> February 1999
<b>Brief Description:</b>	
Located in a residential community park, next to agricultural land.	


Paia (PI)	
	<b>Location:</b> TMK (2)-2-5-005-05, Paia
	<b>Latitude:</b> 20.902031
	<b>Longitude:</b> -156.370344
	<b>Altitude:</b> 80.8 m
	<b>Parameters:</b> PM <sub>2.5</sub>
	<b>Established:</b> March 2014
<b>Brief Description:</b>	
Located within a fenced area that contains a County of Maui water supply tank. The area is surrounded by residential and agricultural land with unharvested sugar cane fields north of the monitor (Station closed on March 31, 2017).	


Kahului (KL)	
	<b>Location:</b> TMK (2)-3—8-007-153, Kahului
	<b>Latitude:</b> 20.869444
	<b>Longitude:</b> -156.492417
	<b>Altitude:</b> 55.5 m
	<b>Parameters:</b> PM <sub>2.5</sub>
	<b>Established:</b> January 2016
<b>Brief Description:</b>	
Located within a fenced area off of Maulani Parkway, TMK 2-3-8-007-153. The area is surrounded primarily by residential land.	


**Figure 3-3: Island of Hawaii – Air Monitoring Stations**




Station	Name	Location	Pollutants Monitored
1	Hilo	1099 Waianuenue Ave.	SO <sub>2</sub> , PM <sub>2.5</sub>
2	Mountain View	18-1235 Volcano Rd.	SO <sub>2</sub> , PM <sub>2.5</sub>
3	Puna E	TMK (3)-1-3-28-37 (Leilani)	H <sub>2</sub> S, SO <sub>2</sub>
4	Pahala	96-3150 Pikake St.	SO <sub>2</sub> , PM <sub>2.5</sub>
5	Ocean View	92-6091 Orchid Mauka Circ.	SO <sub>2</sub> , PM <sub>2.5</sub>
6	Kona	81-1043 Konawaena School Rd.	SO <sub>2</sub> , PM <sub>2.5</sub>


Hilo (HL)	
	<b>Location:</b> 1099 Waianuenue Ave., Hilo
	<b>Latitude:</b> 19.71756
	<b>Longitude:</b> -155.11053
	<b>Altitude:</b> 136.8 m
	<b>Parameters:</b> SO <sub>2</sub> , PM <sub>2.5</sub>
	<b>Established:</b> January 1997
	<b>Brief Description:</b> Located near the Hilo Medical Center, this station was established to monitor vog during “Kona” or southerly wind conditions.


Kona (KN)	
	<b>Location:</b> 81-1043 Konawaena School Rd., Kona
	<b>Latitude:</b> 19.50978
	<b>Longitude:</b> -155.91342
	<b>Altitude:</b> 517.2 m
	<b>Parameters:</b> SO <sub>2</sub> , PM <sub>2.5</sub>
	<b>Established:</b> September 2005
	<b>Brief Description:</b> Located on the upper campus of Konawaena High School, this station monitors for vog on the west side of the island of Hawaii.

Mt. View (MV)	
	<b>Location:</b> 18-1235 Volcano Rd., Mt. View
	<b>Latitude:</b> 19.57002
	<b>Longitude:</b> -155.08046
	<b>Altitude:</b> 436.5 m
	<b>Parameters:</b> SO <sub>2</sub> , PM <sub>2.5</sub>
	<b>Established:</b> December 2010
	<b>Brief Description:</b> Located on the grounds of the Mt. View Elementary School, this station was established to monitor vog during southerly wind conditions.

Ocean View (OV)	
	<b>Location:</b> 92-6091 Orchid Mauka Circle, Ocean View
	<b>Latitude:</b> 19.11756
	<b>Longitude:</b> -155.77814
	<b>Altitude:</b> 862.6 m
	<b>Parameters:</b> SO <sub>2</sub> , PM <sub>2.5</sub>
	<b>Established:</b> April 2010
	<b>Brief Description:</b> This station is located in Hawaii Ocean View Estates at the Ocean View fire station and monitors for volcanic emissions.



Pahala (PA)	
	<b>Location:</b> 96-3150 Pikake St., Pahala
	<b>Latitude:</b> 19.2039
	<b>Longitude:</b> -155.48018
	<b>Altitude:</b> 320 m
	<b>Parameters:</b> SO <sub>2</sub> , PM <sub>2.5</sub>
	<b>Established:</b> August 2007
<b>Brief Description:</b>	
The station is on the grounds of the Kau High and Pahala Elementary School, monitoring for volcanic emissions.	

Puna E (PE)	
	<b>Location:</b> 13-763 Leilani Ave., Pahoa
	<b>Latitude:</b> 19.46399
	<b>Longitude:</b> -154.89871
	<b>Altitude:</b> 207.9 m
	<b>Parameters:</b> SO <sub>2</sub> , H <sub>2</sub> S
	<b>Established:</b> March 1991
<b>Brief Description:</b>	
Located in the Leilani Estates residential subdivision, this station monitors for emissions from the geothermal energy facility approximately 1 mile to the northeast. The station also monitored for SO <sub>2</sub> emissions from the volcano during southwesterly wind conditions, until January 25, 2017, when SO <sub>2</sub> monitoring was discontinued.	

### Figure 3-4: Island of Kauai – Air Monitoring Station



Station	Name	Location	Pollutants Monitored
1	Niumalu	2342 Hulemalu Road	SO <sub>2</sub> , NO <sub>2</sub> , PM <sub>2.5</sub>

Niumalu (NI)	
<b>Location:</b>	2342 Hulemalu Road, Lihue
<b>Latitude:</b>	21.9495
<b>Longitude:</b>	-159.365
<b>Altitude:</b>	11 m
<b>Parameters:</b>	SO <sub>2</sub> , NO <sub>2</sub> , PM <sub>2.5</sub>
<b>Established:</b>	April 2011
<b>Brief Description:</b>	
Located in the Niumalu residential subdivision, this station monitors for emissions from the cruise ships in Nawiliwili Harbor approximately 1.0 mile upwind.	

Table 3-1 State of Hawaii Ambient Air Monitoring Network

	Pollutants Monitored and Station Type									
SITE	PM <sub>10</sub>	PM <sub>2.5</sub>	CO	O <sub>3</sub>	SO <sub>2</sub>	NO <sub>2</sub>	H <sub>2</sub> S	Lead	MONITORING OBJECTIVE	LOCATION SETTING
<b>OAHU</b>										
Honolulu	S	S	S	-	S	-	-	-	Population Exposure	Urban and Center City
Kapolei <sup>1</sup>	S	S,C	S	S	S	S	-	S,C	Population Exposure	Suburban
Pearl City	S	S	-	-	-	-	-	-	Population Exposure	Urban and Center City
Sand Island	-	S	-	S	-	-	-	-	Maximum Concentration (O <sub>3</sub> ) Transport (PM <sub>2.5</sub> )	Urban and Center City
<b>MAUI</b>										
Kihei	-	S	-	-	-	-	-	-	Source Impact (agricultural burning)	Suburban
Paia <sup>2</sup>	-	SPM	-	-	-	-	-	-	Source Impact (agricultural burning)	Neighborhood
Kahului		SPM	-	-	-	-	-	-	Source Impact (agricultural burning)	Neighborhood
<b>HAWAII</b>										
Hilo	-	SPM	-	-	S	-	-	-	Population Exposure	Suburban
Kona	-	SPM	-	-	S	-	-	-	Population Exposure (SO <sub>2</sub> )/ Maximum concentration (PM <sub>2.5</sub> )	Suburban
Mountain View	-	SPM	-	-	SPM	-	-	-	Source Impact	Suburban
Ocean View	-	SPM	-	-	SPM	-	-	-	Welfare Impact (SO <sub>2</sub> )/ Source Impact (PM <sub>2.5</sub> )	Rural
Pahala	-	SPM	-	-	SPM	-	-	-	Maximum concentration (SO <sub>2</sub> )/ Source Impact (PM <sub>2.5</sub> )	Rural
Puna E	-	-	-	-	SPM <sup>3</sup>	-	SPM	-	Source Impact (geothermal and volcano)	Suburban
<b>KAUAI</b>										
Niumalu	-	SPM		-	SPM	SPM	-	-	Source Impact (cruise ships)	Suburban

C = Collocated Site

S = (SLAMS) State and Local Air Monitoring Station

SPM = Special Purpose Monitoring Station (for monitoring vog, geothermal energy production and cruise ships)

<sup>1</sup>Includes NCore station.

<sup>2</sup>Paia was discontinued March 31, 2017.

<sup>3</sup>Monitoring for SO<sub>2</sub> was discontinued January 25, 2017.

**Table 3-2 Sampling Equipment at Each Monitoring Station**

Monitoring Station	PM <sub>10</sub> Continuous Ambient Particulate Monitor	PM <sub>2.5</sub> Manual Particulate Monitor	PM <sub>2.5</sub> Continuous Monitor	CO Continuous Gas Filter Correlation Analyzer	SO <sub>2</sub> Continuous Pulsed Fluorescence Ambient Air Analyzer	O <sub>3</sub> Continuous UV Photometric Analyzer	NO <sub>2</sub> Continuous Chemiluminescence Analyzer	H <sub>2</sub> S Continuous Pulsed Fluorescence Ambient Air Analyzer	Lead 1 in 6 Days Total Suspended Particulate Monitor
<b>OAHU</b>									
Honolulu	■		■	■	■				
Kapolei	■	■	■	■	■	■	■		■
Pearl City	■		■						
Sand Island			■			■			
<b>MAUI</b>									
Kihei			■						
Paia			■						
Kahului			■						
<b>HAWAII</b>									
Hilo			■		■				
Kona			■		■				
Mt. View			■		■				
Ocean View			■		■				
Pahala			■		■				
Puna E					■			■	
<b>KAUAI</b>									
Niumalu			■		■		■		

## Section 4

# 2017 AIR QUALITY DATA

To protect the state's air quality from degradation, the Department of Health's Clean Air Branch is responsible for regulating and monitoring pollution sources to ensure that the levels of criteria pollutants remain well below the state and federal ambient air quality standards. Data collected from the ambient air network is validated by the Air Surveillance and Analysis Section to ensure that the reported data is of good quality and meets all quality control and assurance requirements.

The monitoring stations in communities near the volcano record higher levels of SO<sub>2</sub> and PM<sub>2.5</sub>, with regular exceedances of the NAAQS for SO<sub>2</sub> and occasional exceedances of the NAAQS for PM<sub>2.5</sub>. The EPA considers the volcano a natural, uncontrollable event and therefore the state is requesting exclusion of these NAAQS exceedances from attainment/non-attainment determination.

Excluding the exceedances due to the volcano, in 2017 the State of Hawaii was in attainment of all NAAQS.

### **Explanation of Summary Tables 4-1 through 4-18:**

- Summaries are by pollutant and averaging period, with the number of occurrences exceeding the NAAQS or, in Table 4-17, the number of exceedances of the state H<sub>2</sub>S standard (there is no federal H<sub>2</sub>S standard);
- The "Maximum" is the highest and second highest valid values recorded in the year for the averaging period. For PM<sub>2.5</sub>, the maximum and 98<sup>th</sup> percentile concentrations are provided and for O<sub>3</sub>, the 4<sup>th</sup> highest daily maximum value is also displayed;
- The "Annual Mean" is the arithmetic mean of all valid values recorded in the year;
- "Possible Periods" is the total number of possible sampling periods in the year for the averaging period;
- "Valid Periods" is the total number of acceptable sampling periods after data validation;
- "Percent Recovery" represents the amount of quality data reported;
- Attainment with the NAAQS is determined according to 40 CFR 50.

### **Explanation of Tables 4-19 through 4-29:**

- For each pollutant and averaging period, the highest concentration for each month is presented;
- The month with the highest value recorded in the year for each site is highlighted.

**Table 4-1. 2017 Summary of the 24-Hour PM<sub>10</sub> Averages**

	Maximum		Annual Mean	No. of 24-hour Averages Greater than 150 µg/m <sup>3</sup>														
	1 <sup>st</sup> High	2 <sup>nd</sup> High	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Possible Periods	Valid Periods	Percent Recovery
<b>OAHU</b>																		
Honolulu	31	29	11.8	0	0	0	0	0	0	0	0	0	0	0	0	365	345	94.5
Kapolei	39	36	13.0	0	0	0	0	0	0	0	0	0	0	0	0	365	352	96.4
Pearl City	39	38	15.2	0	0	0	0	0	0	0	0	0	0	0	0	365	350	95.9

**Table 4-2. Attainment Determination of the 24-Hour PM<sub>10</sub> NAAQS**

Station	Exceedances in 2015	Exceedances in 2016	Exceedances in 2017	Sites in violation of the NAAQS
Honolulu	0	0	0	0
Kapolei	0	0	0	0
Pearl City	0	0	0	0
Attainment: The standard not to be exceeded more than once per year on average over 3 years. <b>In 2017, Hawaii was in attainment with the 24-hour PM<sub>10</sub> NAAQS.</b>				

**Table 4-3. 2017 Summary of the 24-Hour PM<sub>2.5</sub> Averages: SLAMS Stations**

	Maximum		Annual Mean	No. of 24-hour Averages Greater than 35 µg/m <sup>3</sup>														
	1 <sup>st</sup> High	98 <sup>th</sup> %	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Possible Periods	Valid Periods	Percent Recovery
<b>OAHU</b>																		
Honolulu	16.0	9.8	3.0	0	0	0	0	0	0	0	0	0	0	0	0	365	355	97.3
Kapolei	15.5	9.6	4.3	0	0	0	0	0	0	0	0	0	0	0	0	365	312	85.5
Pearl City	18.2	14.1	4.4	0	0	0	0	0	0	0	0	0	0	0	0	365	358	98.1
Sand Island	16.1	10.0	3.0	0	0	0	0	0	0	0	0	0	0	0	0	365	354	97.0
<b>MAUI</b>																		
Kihei	29.1	11.3	4.1	0	0	0	0	0	0	0	0	0	0	0	0	365	349	95.6

**Table 4-4. Attainment Determination of the 24-Hour PM<sub>2.5</sub> NAAQS: SLAMS Stations**

Station	2015 98 <sup>th</sup> value	2016 98 <sup>th</sup> value	2017 98 <sup>th</sup> value	3-Year Average	Sites in violation of the NAAQS
Honolulu	10	11	10	10	0
Kapolei	14	11 <sup>1</sup>	10 <sup>1</sup>	12	0
Pearl City	11	12	14	12	0
Sand Island	12	13	10	12	0
Kihei	13	12	11	12	0
Attainment: The 3-year average of the 98 <sup>th</sup> percentile values must be less than or equal to 35 µg/m <sup>3</sup> . <b>In 2017, Hawaii was in attainment with the 24-hour PM<sub>2.5</sub> NAAQS.</b>					

<sup>1</sup>Does not meet summary criteria, <75% data recovery in one or more quarters.

**Table 4-5. Attainment Determination of the Annual PM<sub>2.5</sub> NAAQS: SLAMS Stations**

Station	2015 Ann. Avg.	2016 Ann. Avg.	2017 Ann. Avg.	3-Year Average	Sites in violation of the NAAQS
Honolulu	3.7	2.1	3.0	2.9	0
Kapolei	4.1	4.0 <sup>1</sup>	4.3 <sup>1</sup>	4.1	0
Pearl City	5.2	2.6	4.4	4.1	0
Sand Island	5.4	4.0	3.0	4.1	0
Kihei	4.7	3.7	4.1	4.2	0
Attainment: The 3-year average of annual mean values must be less than 15 µg/m <sup>3</sup> . <b>In 2017, Hawaii was in attainment with the annual PM<sub>2.5</sub> NAAQS.</b>					

<sup>1</sup>Does not meet summary criteria, <75% data recovery in one or more quarters.

**Table 4-6. 2017 Summary of the 24-Hour PM<sub>2.5</sub> Averages: SPM Stations**

	Maximum		Annual Mean	No. of 24-hour Averages Greater than 35 µg/m <sup>3</sup>														
	1 <sup>st</sup> High	98 <sup>th</sup> %	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Possible Periods	Valid Periods	Percent Recovery
<b>HAWAII</b>																		
Hilo	34.1	23.4	9.6	0	0	0	0	0	0	0	0	0	0	0	0	365	357	97.8
Kona	26.9	23.8	9.3	0	0	0	0	0	0	0	0	0	0	0	0	365	339	92.9
Mt. View <sup>1</sup>	15.2	10.9	2.5	-	-	0	0	0	0	0	0	0	0	0	0	365	253	69.3
Ocean View	25.5	23.5	10.9	0	0	0	0	0	0	0	0	0	0	0	0	365	358	98.1
Pahala	21.1	13.9	5.1	0	0	0	0	0	0	0	0	0	0	0	0	365	355	97.3
<b>KAUAI</b>																		
Niumalu	13.2	9.0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	365	350	95.9
<b>MAUI</b>																		
Kahului	13.4	9.9	4.2	0	0	0	0	0	0	0	0	0	0	0	0	365	322	88.2
Paia <sup>2</sup>	14.2	13.8	4.6	0	0	0	-	-	-	-	-	-	-	-	-	90	90	100.0
The special purpose stations on Hawaii island were established to monitor ambient air concentrations of PM <sub>2.5</sub> from volcanic emissions. The special purpose station on Kauai was established to monitor emissions from cruise ships. The special purpose stations on Maui were established to monitor emissions from agricultural burning.																		

<sup>1</sup>Does not meet summary criteria, <75% data recovery in one or more quarters.

<sup>2</sup>Paia was closed March 31, 2017.

**Table 4-7. 2017 Summary of the 8-Hour O<sub>3</sub> Averages**

	Maximum			Annual Mean	No. of Daily Maximum 8-Hour Averages Greater than 0.070 ppm														
	1 <sup>st</sup> High	2 <sup>nd</sup> High	4 <sup>th</sup> High	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Possible Periods	Valid Periods	Percent Recovery
<b>OAHU</b>																			
Sand Island	0.050	0.050	0.049	0.029	0	0	0	0	0	0	0	0	0	0	0	0	8755	8080	92.3
Kapolei	0.052	0.051	0.049	0.030	0	0	0	0	0	0	0	0	0	0	0	0	8755	7435	84.9



**Table 4-8. Attainment Determination of the 8-Hour O<sub>3</sub> NAAQS**

Station	2015 4 <sup>th</sup> highest	2016 4 <sup>th</sup> highest	2017 4 <sup>th</sup> highest	3-Year Average	Site in violation of the NAAQS
Sand Island	0.049	0.048	0.049	0.049	0
Kapolei	0.049	0.048	0.049	0.049	0
Attainment: The 3-year average of the annual 4 <sup>th</sup> highest daily maximum 8-hour average must be less than or equal to 0.070 ppm. <b>In 2017, Hawaii was in attainment with the 8-hour O<sub>3</sub> NAAQS.</b>					

**Table 4-9. 2017 Summary of the 1-Hour and Annual NO<sub>2</sub> Averages**

	Maximum 1-hr		Annual Mean	No. of Daily Maximum 1-Hour Averages Greater than 0.100 ppm														
	1 <sup>st</sup> High	98 <sup>th</sup> %	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Possible Periods	Valid Periods	Percent Recovery
<b>OAHU</b>	<b>SLAMS stations</b>																	
Kapolei	0.041	0.033	0.004	0	0	0	0	0	0	0	0	0	0	0	0	8760	8250	94.2
<b>KAUAI</b>	<b>SPM Station</b>																	
Niumalu <sup>1</sup>	0.038	0.031	0.002	0	0	0	0	0	0	0	0	0	0	0	0	8760	5979	68.3 <sup>1</sup>
Attainment of the annual NO <sub>2</sub> NAAQS: The annual mean shall not exceed 0.053 ppm. <b>In 2017, Hawaii was in attainment with the annual NO<sub>2</sub> NAAQS.</b>																		

<sup>1</sup>Does not meet summary criteria, <75% data recovery in one or more quarters.

**Table 4-10. Attainment Determination of the 1-Hour NO<sub>2</sub> NAAQS**

Station	2015 98 <sup>th</sup> value	2016 98 <sup>th</sup> value	2017 98 <sup>th</sup> value	3-Year Average	Site in violation of the NAAQS
Kapolei	0.022	0.029	0.033	0.028	0
Attainment: The 3-year average of the 98 <sup>th</sup> percentile values must be less than or equal to 0.100 ppm. <b>In 2017, Hawaii was in attainment with the 1-hour NO<sub>2</sub> NAAQS.</b>					

#### 4-11. 2017 Summary of the 1-Hour SO<sub>2</sub> Averages

	Maximum		Annual Mean	No. of 1-hour Averages Greater than 0.075 ppm														
	1 <sup>st</sup> High	99 <sup>th</sup> %	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Possible Periods	Valid Periods	Percent Recovery
<b>OAHU</b>	<b>SLAMS Stations</b>																	
Honolulu	0.008	0.004	0.000	0	0	0	0	0	0	0	0	0	0	0	0	8760	8066	92.1
Kapolei	0.012	0.008	0.001	0	0	0	0	0	0	0	0	0	0	0	0	8760	8234	94.0
<b>HAWAII</b>	<b>SPM Stations (see NOTE)</b>																	
Hilo	0.668	0.359	0.005	6	3	2	2	1	0	0	1	1	2	0	1	8760	8068	92.1
Kona	0.146	0.041	0.004	1	0	0	0	0	0	0	0	0	0	0	0	8760	8580	97.9
Mt. View <sup>1</sup>	0.503	0.269	0.003	0	0	4	3	1	0	0	0	0	4	0	3	8760	7252	82.8
Ocean View	0.739	0.480	0.016	13	11	14	14	17	7	8	6	7	5	9	12	8760	8556	97.7
Pahala	0.858	0.674	0.035	25	22	15	15	23	20	23	19	17	15	17	18	8760	8416	96.1
Puna E <sup>2</sup>	0.012	0.012	0.003	0	-	-	-	-	-	-	-	-	-	-	-	600	586	97.7
<b>KAUAI</b>	<b>SPM Station</b>																	
Niimalu	0.003	0.002	0.001	0	0	0	0	0	0	0	0	0	0	0	0	8760	8164	93.2
<p>Attainment: The 3-year average of the 99<sup>th</sup> percentile values must be less than or equal to 0.075 ppm. Effective June 2, 2010.  <b>In 2017, Hawaii was in attainment with the 1-hour SO<sub>2</sub> NAAQS (SLAMS stations only).</b></p> <p>NOTE: The SPM stations on Hawaii Island were established to monitor ambient air concentrations of SO<sub>2</sub> from volcanic emissions. Although Hilo and Kona stations are designated SLAMS, the values are still mostly attributed to volcanic emissions. Volcanic eruptions are considered natural events and therefore EPA may exclude the exceedances of the 1-hour NAAQS from attainment determinations. The SPM station on Kauai was established to monitor emissions from cruise ships.</p>																		

<sup>1</sup>Does not meet summary criteria, <75% data recovery in one or more quarters.

<sup>2</sup>SO<sub>2</sub> monitoring for Puna E was discontinued January 25, 2017.

**Table 4-12. Attainment Determination of the 1-Hour SO<sub>2</sub> NAAQS: SLAMS Stations**

	2015 99 <sup>th</sup> value	2016 99 <sup>th</sup> value	2017 99 <sup>th</sup> value	3-Year Average	Violation of the NAAQS
<b>OAHU SLAMS stations</b>					N= NO Y= YES
Honolulu	0.010	0.007	0.004	0.007	N
Kapolei	0.013	0.008	0.008	0.010	N
<b>HAWAII SPM stations (SEE note)</b>					
Hilo	0.236	0.313	0.359	0.303	Y
Kona	0.031	0.044 <sup>1</sup>	0.041	0.039	N
Mt. View	0.276	0.251 <sup>1</sup>	0.269	0.265	Y
Ocean View	0.382	0.532	0.480	0.465	Y
Pahala	0.496	0.558	0.674	0.576	Y
Puna E <sup>2</sup>	0.015	0.041	0.012 <sup>2</sup>	0.023	N
<b>KAUAI SPM station</b>					
Niumalu	0.014	0.008 <sup>1</sup>	0.002	0.008	N
<p>Attainment: The 3-year average of the 99<sup>th</sup> percentile values must be less than or equal to 0.075 ppm. Effective June 2, 2010.</p> <p><b>In 2017, Hawaii was in attainment with the 1-hour SO<sub>2</sub> NAAQS (SLAMS stations only).</b></p> <p>NOTE: The SPM stations on Hawaii Island were established to monitor ambient air concentrations of SO<sub>2</sub> from volcanic emissions. Although Hilo and Kona stations are designated SLAMS, the values are still mostly attributed to volcanic emissions. Volcanic eruptions are considered natural events and therefore EPA may exclude the exceedances of the 1-hour NAAQS from attainment determinations. The SPM station on Kauai was established to monitor emissions from cruise ships.</p>					

<sup>1</sup>Does not meet summary criteria, <75% data recovery in one or more quarters.

<sup>2</sup>SO<sub>2</sub> monitoring for Puna E was discontinued January 25, 2017.

**Table 4-13. 2017 Summary of the 3-Hour SO<sub>2</sub> Averages**

	Maximum		Annual Mean	No. of 3-hour Averages Greater than 0.5 ppm														
	1 <sup>st</sup> High	2 <sup>nd</sup> High	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Possible Periods	Valid Periods	Percent Recovery
<b>OAHU</b>	<b>SLAMS stations</b>																	
Honolulu	0.004	0.004	0.000	0	0	0	0	0	0	0	0	0	0	0	0	2920	2633	90.2
Kapolei	0.006	0.006	0.001	0	0	0	0	0	0	0	0	0	0	0	0	2920	2667	91.3
<b>HAWAII</b>	<b>SPM stations (see NOTE)</b>																	
Hilo	0.565	0.322	0.005	1	0	0	0	0	0	0	0	0	0	0	0	2920	2616	89.6
Kona	0.091	0.074	0.004	0	0	0	0	0	0	0	0	0	0	0	0	2920	2749	94.1
Mt. View <sup>1</sup>	0.329	0.174	0.004	0	0	0	0	0	0	0	0	0	0	0	0	2920	2318	79.4
Ocean View	0.563	0.367	0.016	0	1	0	0	0	0	0	0	0	0	0	0	2920	2741	93.9
Pahala	0.594	0.483	0.035	1	0	0	0	0	0	0	0	0	0	0	0	2920	2713	92.9
Puna E <sup>2</sup>	0.008	0.007	0.003	0	-	-	-	-	-	-	-	-	-	-	-	200	186	93.0
<b>KAUAI</b>	<b>SPM station</b>																	
Niimalu	0.003	0.002	0.001	0	0	0	0	0	0	0	0	0	0	0	0	2920	2678	91.7
Attainment: 3-hour values not to exceed 0.5 ppm more than once per year. <b>In 2017, Hawaii was in attainment with the 3-hour SO<sub>2</sub> NAAQS (SLAMS stations only).</b> NOTE: The SPM stations on Hawaii island were established to monitor ambient air concentrations of SO <sub>2</sub> from volcanic emissions. Although Hilo and Kona stations are designated SLAMS, the values are still mostly attributed to volcanic emissions. Volcanic eruptions are considered natural events and therefore EPA may exclude the exceedances of the 3-hour NAAQS from attainment determinations.																		

<sup>1</sup>Does not meet summary criteria, <75% data recovery in one or more quarters.

<sup>2</sup>SO<sub>2</sub> monitoring for Puna E was discontinued January 25, 2017.

**Table 4-14. 2017 Summary of the 24-Hour and Annual SO<sub>2</sub> Averages**

	Maximum		Annual Mean	No. of 24-hour Averages Greater than 0.140 ppm														
	1 <sup>st</sup> High	2 <sup>nd</sup> High	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Possible Periods	Valid Periods	Percent Recovery
<b>OAHU</b>	<b>SLAMS Stations</b>																	
Honolulu	0.002	0.002	0.000	0	0	0	0	0	0	0	0	0	0	0	0	365	339	92.9
Kapolei	0.003	0.003	0.001	0	0	0	0	0	0	0	0	0	0	0	0	365	353	96.7
<b>HAWAII</b>	<b>SPM Stations (see NOTE)</b>																	
Hilo	0.110	0.095	0.005	0	0	0	0	0	0	0	0	0	0	0	0	365	357	97.8
Kona	0.029	0.015	0.004	0	0	0	0	0	0	0	0	0	0	0	0	365	365	100.0
Mt. View <sup>1</sup>	0.080	0.053	0.003	0	0	0	0	0	0	0	0	0	0	0	0	365	306	83.8
Ocean View	0.136	0.101	0.016	0	0	0	0	0	0	0	0	0	0	0	0	365	365	100.0
Pahala	0.153	0.141	0.035	0	0	0	1	0	0	0	0	0	0	0	0	365	360	98.6
Puna E <sup>2</sup>	0.006	0.004	0.003	0	-	-	-	-	-	-	-	-	-	-	-	25	25	100.0
<b>KAUAI</b>	<b>SPM Station</b>																	
Niimalu	0.002	0.002	0.001	0	0	0	0	0	0	0	0	0	0	0	0	365	338	92.6

Attainment: 24-hour values not to exceed 0.14 ppm more than once per year.

**In 2017, Hawaii was in attainment of the state 24-hour SO<sub>2</sub> standard (SLAMS stations only).**

NOTE: The SPM stations on Hawaii island were established to monitor ambient air concentrations of SO<sub>2</sub> from volcanic emissions. Although Hilo and Kona stations are designated SLAMS, the values are still mostly attributed to volcanic emissions. Volcanic eruptions are considered natural events and therefore EPA may exclude the exceedances of the 24-hour NAAQS from attainment determinations.

Attainment: Annual average (from SLAMS stations only) not to exceed 0.03 ppm.

**In 2017, Hawaii was in attainment of the state annual SO<sub>2</sub> standard.**

NOTE: The SPM stations on Hawaii island were established to monitor ambient air concentrations of SO<sub>2</sub> from volcanic emissions. Although Hilo and Kona stations are designated SLAMS, the values are still mostly attributed to volcanic emissions. Volcanic eruptions are considered natural events and therefore EPA may exclude the exceedances of the annual NAAQS from attainment determinations.

<sup>1</sup>Does not meet summary criteria, <75% data recovery in one or more quarters.

<sup>2</sup>SO<sub>2</sub> monitoring for Puna E was discontinued January 25, 2017.

	Maximum		Annual Mean	No. of 1-hour Averages Greater than 35 ppm														
	1 <sup>st</sup> High	2 <sup>nd</sup> High	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Possible Periods	Valid Periods	Percent Recovery
<b>OAHU</b>	<b>SLAMS stations</b>																	
Honolulu	1.4	1.3	0.5	0	0	0	0	0	0	0	0	0	0	0	0	8760	8156	93.1
Kapolei	1.7	1.7	0.2	0	0	0	0	0	0	0	0	0	0	0	0	8760	8207	93.7
Attainment: 1-hour values not to exceed 35 ppm more than once per year. <b>In 2017, Hawaii was in attainment with the 1-hour CO NAAQS.</b>																		

### Table 4-16. 2017 Summary of the 8-Hour CO Averages

	Maximum		Annual Mean	No. of 8-hour Averages Greater than 9 ppm														
	1 <sup>st</sup> High	2 <sup>nd</sup> High	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Possible Periods	Valid Periods	Percent Recovery
<b>OAHU</b>	<b>SLAMS stations</b>																	
Honolulu	0.9	0.9	0.5	0	0	0	0	0	0	0	0	0	0	0	0	8755	7858	89.8
Kapolei	1.1	1.0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	8755	7968	91.0
Attainment: 8-hour values not to exceed 9 ppm more than once per year. <b>In 2017, Hawaii was in attainment with the 8-hour CO NAAQS.</b>																		

**Table 4-17. 2017 Summary of the 1-Hour H<sub>2</sub>S Averages (State Standard)**

	Maximum		Annual Mean	No. of 1-hour Averages Greater than 0.025 ppm														
	1 <sup>st</sup> High	2 <sup>nd</sup> High	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Possible Periods	Valid Periods	Percent Recovery
<b>HAWAII</b>																		
Puna E	0.002	0.002	0.001	0	0	0	0	0	0	0	0	0	0	0	0	8264	8760	94.3
Attainment of the state standard: 1-hour values not to exceed 0.025 ppm. <b>In 2017, Hawaii was in attainment of the state 1-hour H<sub>2</sub>S standard.</b>																		

**Table 4-18. 2017 Summary of the Rolling 3-Month Lead Averages**

	Maximum		Annual Mean	No. of 3-Month Averages Greater than 0.15 µg/m <sup>3</sup>														
	1 <sup>st</sup> High	2 <sup>nd</sup> High	All Hours	Rolling 3-Month period ending in the month of												Possible Periods	Valid Periods	Percent Recovery
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
<b>HAWAII</b>																		
Kapolei	0.036	0.002	0.001	0	0	0	0	0	0	0	0	0	0	0	0	61	57	93.4
Attainment: Maximum 3-month average concentration for a 3-year period must be less than or equal to 0.15 µg/m <sup>3</sup> . Note: Sampling for lead conducted 1 in 6 days. Sampling began 1/1/2012.																		

**Table 4-19. 2017 Monthly Maximum of 24-Hour PM<sub>10</sub> Values (µg/m<sup>3</sup>)**

The month with the highest value in the year is highlighted

*The state and federal 24-hr PM<sub>10</sub> standard is 150 µg/m<sup>3</sup>*

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Honolulu	31	29	21	23	18	18	19	17	18	18	16	26
Kapolei	39	36	22	22	20	20	18	18	17	19	24	27
Pearl City	39	34	26	26	22	20	21	18	20	24	23	27

**Table 4-20. 2017 Monthly Maximum of 24-Hour PM<sub>2.5</sub> Values (µg/m<sup>3</sup>)**

The month with the highest value in the year is highlighted

*The federal 24-hr PM<sub>2.5</sub> standard is 35 µg/m<sup>3</sup>*

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>SLAMS Stations</b>												
Honolulu	10.2	16.0	15.7	9.0	6.1	5.1	4.6	4.9	3.8	14.4	10.7	8.9
Kapolei <sup>1</sup>	5.2	11.0	15.5	9.5	6.6	6.0	5.5	5.7	6.9	13.7	12.9	9.6
Pearl City	15.6	16.2	18.2	8.9	6.5	5.0	5.2	6.0	8.2	14.3	16.1	13.4
Sand Island	11.2	14.9	16.1	6.7	4.8	3.6	4.4	5.6	6.1	13.8	9.7	7.7
Kihei	26.2	15.8	12.1	7.1	9.0	29.1	10.1	5.1	6.4	10.9	11.3	10.1
<b>SPM Stations</b>												
Niimalu (cruise ships)	13.2	9.3	10.2	7.7	6.8	6.3	11.2	6.9	3.0	5.9	7.1	11.1
Hilo (volcano)	25.0	34.1	25.5	24.1	20.1	21.4	12.2	8.7	8.2	14.3	10.1	14.5
Kahului <sup>1</sup>	3.7	13.4	6.5	8.0	8.1	7.2	8.5	9.7	8.5	11.2	13.0	10.0
Kona (volcano)	26.9	26.2	20.0	22.2	16.2	12.2	8.3	10.5	10.2	10.1	11.8	13.1
Mt. View (volcano) <sup>1</sup>	-	-	4.7	11.1	6.6	6.2	5.7	1.9	5.3	13.0	11.5	15.2
Ocean View (volcano)	25.5	24.7	23.5	21.3	7.6	12.2	14.7	15.7	19.4	18.6	17.8	15.5
Pahala (volcano)	21.1	15.5	13.9	12.3	7.5	7.6	11.6	7.5	10.6	7.5	13.2	15.3
Paia (cane burning) <sup>2</sup>	13.8	14.2	13.5	-	-	-	-	-	-	-	-	-

<sup>1</sup>Does not meet summary criteria, <75% data recovery in one or more quarters.

<sup>2</sup>Paia was discontinued March 31, 2017.



**Table 4-21. 2017 Monthly Maximum of 1-Hour NO<sub>2</sub> Values (ppm)**

The month with the highest value in the year is highlighted

*The federal 1-hour standard for NO<sub>2</sub> is 0.100 ppm*

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Kapolei	0.041	0.038	0.028	0.027	0.032	0.017	0.014	0.017	0.024	0.030	0.026	0.030
Niualu <sup>1</sup>	0.032	0.032	-	0.020	0.029	0.016	0.016	0.014	0.020	0.002	0.035	0.038

<sup>1</sup>Does not meet summary criteria, <75% data recovery in one or more quarters.**Table 4-22. 2017 Monthly Maximum of 1-Hour CO Values (ppm)**

The month with the highest value in the year is highlighted

*The federal 1-hr CO standard is 35 ppm, the state standard is 9ppm*

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Honolulu	1.4	1.0	1.1	0.9	1.1	0.5	0.6	0.8	1.0	1.0	1.0	0.9
Kapolei	0.7	0.7	0.7	0.4	0.1	0.5	0.6	0.7	0.6	0.8	0.7	1.7

**Table 4-23. 2017 Monthly Maximum of 8-Hour CO Values (ppm)**

The month with the highest value in the year is highlighted

*The federal 8-hr CO standard is 9 ppm, the state standard is 4.4 ppm*

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Honolulu	0.9	0.7	0.8	0.8	0.9	0.4	0.6	0.7	0.7	0.7	0.6	0.6
Kapolei	0.5	0.4	0.4	0.3	-1.0	0.4	0.5	0.5	0.5	0.6	0.5	1.1

#### 4-24. 2017 Monthly Maximum of 8-Hour O<sub>3</sub> Values (ppm)

The month with the highest value in the year is highlighted

The federal 8-hr O<sub>3</sub> standard is 0.070 ppm

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Sand Island	0.047	0.050	0.042	0.050	0.044	0.037	0.029	0.030	0.034	0.045	0.046	0.046
Kapolei NCore	0.049	0.052	0.048	0.052	0.045	0.034	0.030	0.029	0.033	0.041	0.044	0.046

#### Table 4-25. 2017 Monthly Maximum of 1-Hour SO<sub>2</sub> Values (ppm)

The month with the highest value in the year is highlighted

The federal 1-hr SO<sub>2</sub> standard is 0.075 ppm (75 ppb)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>SLAMS Stations</b>												
Honolulu	0.004	0.003	0.006	0.002	0.001	0.001	0.000	0.001	0.001	0.004	0.008	0.002
Kapolei	0.004	0.010	0.004	0.006	0.007	0.002	0.003	0.003	0.012	0.005	0.008	0.006
<b>SPM Stations (see NOTE)</b>												
Niimalu (cruise ships)	0.003	0.002	0.002	0.002	0.002	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Hilo (volcano)	0.667	0.435	0.356	0.359	0.082	0.023	0.040	0.082	0.098	0.281	0.049	0.131
Kona (volcano)	0.146	0.041	0.015	0.026	0.014	0.017	0.021	0.018	0.029	0.024	0.048	0.033
Mt. View (volcano) <sup>1</sup>	-	0.041	0.464	0.503	0.304	0.002	0.012	0.028	0.060	0.190	0.057	0.126
Ocean View (volcano)	0.394	0.739	0.424	0.364	0.260	0.281	0.262	0.202	0.247	0.573	0.170	0.316
Pahala (volcano)	0.827	0.581	0.589	0.858	0.340	0.337	0.379	0.333	0.515	0.444	0.674	0.39
Puna E (volcano) <sup>2</sup>	0.0115	-	-	-	-	-	-	-	-	-	-	-

NOTE: The SPM stations on Hawaii Island were established to monitor ambient air concentrations of SO<sub>2</sub> from volcanic emissions. Although Hilo and Kona stations are designated SLAMS, the values are still mostly attributed to volcanic emissions. Volcanic eruptions are considered natural events and therefore EPA may exclude the exceedances of the 1-hour NAAQS from attainment determinations.

<sup>1</sup>Does not meet summary criteria, <75% data recovery in one or more quarters.

<sup>2</sup>SO<sub>2</sub> monitoring for Puna E was discontinued January 25, 2017.

**Table 4-26. 2017 Monthly Maximum of 3-Hour SO<sub>2</sub> Values (ppm)**

The month with the highest value in the year is highlighted

*The state and federal 3-hr SO<sub>2</sub> standard is 0.5 ppm*

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>SLAMS Stations</b>												
Honolulu	0.003	0.002	0.004	0.001	0.001	0.001	0.000	0.001	0.001	0.003	0.004	0.002
Kapolei	0.003	0.005	0.003	0.005	0.003	0.002	0.002	0.003	0.006	0.004	0.006	0.004
<b>SPM Stations (see NOTE)</b>												
Niimalu (cruise ships)	0.003	0.002	0.002	0.002	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Hilo (volcano)	0.565	0.242	0.244	0.185	0.053	0.005	0.023	0.051	0.068	0.161	0.036	0.063
Kona (volcano)	0.091	0.026	0.012	0.022	0.011	0.014	0.018	0.015	0.022	0.022	0.040	0.031
Mt. View (volcano) <sup>1</sup>	-	0.030	0.329	0.174	0.127	0.001	0.007	0.008	0.042	0.107	0.034	0.092
Ocean View (volcano)	0.313	0.563	0.349	0.192	0.167	0.140	0.181	0.134	0.187	0.319	0.082	0.226
Pahala (volcano)	0.594	0.430	0.425	0.483	0.243	0.232	0.313	0.257	0.229	0.303	0.408	0.208
Puna E (volcano) <sup>2</sup>	0.008	-	-	-	-	-	-	-	-	-	-	-

NOTE: The SPM stations on Hawaii Island were established to monitor ambient air concentrations of SO<sub>2</sub> from volcanic emissions. Volcanic eruptions are considered natural events and therefore EPA may exclude the exceedances of the 3-hour NAAQS from attainment determinations.

<sup>1</sup>Does not meet summary criteria, <75% data recovery in one or more quarters.

<sup>2</sup>SO<sub>2</sub> monitoring for Puna E was discontinued January 25, 2017.

**Table 4-27. 2017 Monthly Maximum of 24-Hour SO<sub>2</sub> Values (ppm)**

The month with the highest value in the year is highlighted

The state 24-hr SO<sub>2</sub> standard is 0.14 ppm

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>SLAMS Stations</b>												
Honolulu	0.002	0.001	0.002	0.001	0.001	0.001	0.000	0.000	0.001	0.001	0.001	0.001
Kapolei	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.003	0.003	0.002	0.001
<b>SPM Stations (see NOTE)</b>												
Niimalu (cruise ships)	0.002	0.002	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001
Hilo (volcano)	0.110	0.095	0.047	0.0477	0.011	0.004	0.008	0.014	0.020	0.032	0.009	0.020
Kona (volcano)	0.029	0.009	0.006	0.008	0.004	0.006	0.005	0.007	0.007	0.009	0.015	0.013
Mt. View (volcano) <sup>1</sup>	-	0.005	0.080	0.053	0.021	0.001	0.002	0.004	0.012	0.026	0.011	0.032
Ocean View (volcano)	0.096	0.136	0.101	0.051	0.040	0.043	0.0349	0.047	0.046	0.046	0.023	0.063
Pahala (volcano)	0.141	0.102	0.099	0.153	0.060	0.060	0.118	0.076	0.097	0.100	0.125	0.078
Puna E (volcano) <sup>2</sup>	0.006	-	-	-	-	-	-	-	-	-	-	-

NOTE: The SPM stations on Hawaii Island were established to monitor ambient air concentrations of SO<sub>2</sub> from volcanic emissions. Volcanic eruptions are considered natural events and therefore EPA may exclude the exceedances of the 24-hour NAAQS from attainment determinations.

<sup>1</sup>Does not meet summary criteria, <75% data recovery in one or more quarters.

<sup>2</sup>SO<sub>2</sub> monitoring for Puna E was discontinued January 25, 2017.

**Table 4-28. 2017 Monthly Maximum of 1-Hour H<sub>2</sub>S Values (ppm)**

The month with the highest value in the year is highlighted

The state 1-hour H<sub>2</sub>S standard is .025 ppm

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Puna E	0.002	0.001	0.002	0.001	0.001	0.001	0.001	0.002	0.001	0.002	0.002	0.002

**Table 4-29. 2017 Monthly Maximum of Rolling 3-Month Lead Values (µg/m<sup>3</sup>)**

The month with the highest value in the year is highlighted

The federal rolling 3-month lead standard is 0.15 µg/m<sup>3</sup>

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Kapolei NCore (1 in 6 days)	0.036	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.002	0.001	0.000	0.000

## Section 5

# 2017 PM<sub>2.5</sub> SPECIATION DATA

Atmospheric aerosols are solid or liquid particles suspended in air that come directly from a variety of sources (primary) or are formed by chemical reactions (secondary). Primary and secondary particles tend to have long lifetimes in the atmosphere and can travel long distances, up to hundreds or perhaps thousands of miles. Sources include dust from roads, construction, and agriculture; combustion particles from motor vehicles, electric utilities and agricultural burning; and particles from natural sources such as the ocean or volcano.

Most of the PM<sub>2.5</sub> is a combination of the following components: sulfates, nitrates, ammonium, elemental carbon, organic compounds, water and metals. The EPA selected target particulates of interest based on data use objectives, primary constituents of PM<sub>2.5</sub>, and the capability and availability of current analytical methods.

The filter-based speciation sampler collects samples once every 3 days for analyses performed by an EPA contract laboratory. The speciation sampler is located at the Kapolei NCore monitoring station.

Table 5-1 lists the parameters measured, highest and second highest values recorded in the year, the annual arithmetic mean of all valid samples and the total number of samples collected in the year. Table 5-2 lists the analysis methods for each parameter.

With the exception of lead, there are no ambient air quality standards for the individual components of speciated PM<sub>2.5</sub>.

For more information on EPA's speciation program, go to:  
[www.epa.gov/ttn/amtic/speciepg.html](http://www.epa.gov/ttn/amtic/speciepg.html)

**Table 5-1. Annual Summary of PM<sub>2.5</sub> Speciation Data**

Parameter	1 <sup>st</sup> High (µg/m <sup>3</sup> )	2 <sup>nd</sup> High (µg/m <sup>3</sup> )	Annual Mean (µg/m <sup>3</sup> )	No. of Samples	Percent Recovery
<b>CARBON</b>					
Organic Carbon	0.773	0.745	0.2332	101	83
Elemental Carbon	0.332	0.244	0.0559	101	83
<b>METALS</b>					
Aluminum	0.102	0.080	0.0100	107	88
Antimony	0.046	0.040	0.0049	107	88
Arsenic	0.007	0.007	0.0006	107	88
Barium	0.088	0.077	0.0056	107	88
Bromine	0.007	0.007	0.0018	107	88
Cadmium	0.022	0.019	0.0008	107	88
Calcium	0.281	0.131	0.0493	107	88
Cerium	0.102	0.083	0.0099	107	88
Cesium	0.052	0.049	0.0035	107	88
Chlorine	1.756	1.724	0.5291	107	88
Chromium	0.057	0.019	0.0017	107	88
Cobalt	0.003	0.003	0.0000	107	88
Copper	0.009	0.008	0.0027	107	88
Indium	0.024	0.022	-0.0004	107	88
Iron	0.185	0.107	0.0288	107	88
Lead	0.021	0.019	0.0010	107	88
Magnesium	0.215	0.199	0.0393	107	88
Manganese	0.004	0.004	0.0002	107	88
Nickel	0.021	0.019	0.0045	107	88
Phosphorus	0.005	0.004	0.0003	107	88
Potassium	0.205	0.071	0.0342	107	88
Rubidium	0.009	0.009	0.0001	107	88
Selenium	0.007	0.006	0.0003	107	88
Silicon	0.159	0.141	0.0370	107	88
Silver	0.026	0.021	0.0016	107	88
Sodium	1.300	1.135	0.3884	107	88
Strontium	0.008	0.007	0.0010	107	88
Sulfur	2.848	2.344	0.3246	107	88
Tin	0.068	0.039	0.0043	107	88
Titanium	0.009	0.009	0.0025	107	88
Vanadium	0.024	0.019	0.0041	107	88
Zinc	0.011	0.006	0.0016	107	88
Zirconium	0.031	0.030	0.0013	107	88

Table 5-1 Continued

Parameter	1 <sup>st</sup> High ( $\mu\text{g}/\text{m}^3$ )	2 <sup>nd</sup> High ( $\mu\text{g}/\text{m}^3$ )	Annual Mean ( $\mu\text{g}/\text{m}^3$ )	No. of Samples	Percent Recovery
<b>IONS</b>					
Ammonium Ion	1.50	1.25	0.087	107	88
Potassium Ion	0.08	0.05	0.012	107	88
Sodium Ion	1.89	1.40	0.397	107	88
Total Nitrate	0.36	0.34	0.133	107	88
Sulfate	7.94	7.24	0.943	107	88

**Table 5-2. Speciation Collection and Analysis Methods**

Parameter	Collection Method	Analysis Method
Carbon	URG 300N Quartz Filter	Thermal Optical Transmittance
Metals	Met-One SASS Teflon Filter	Energy Dispersive X-Ray Fluorescence
Ions	Met-One SASS Nylon Filter	Ion Chromatography

## **Section 6**

# **AMBIENT AIR QUALITY TRENDS**

The following graphs illustrate 5-year trends for PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, NO<sub>2</sub>, O<sub>3</sub>, and CO from 2013 to 2017 at all SLAMS stations monitoring for those pollutants.

Figures 6-1 and 6-2 are graphs of the PM<sub>10</sub> annual and maximum 24-hour averages.

Figure 6-3 is the graph of the PM<sub>2.5</sub> annual averages. Attainment of the PM<sub>2.5</sub> 24-hour standard is based on the 98<sup>th</sup> percentile value at each station, which is depicted in Figure 6-4.

Figures 6-5 and 6-6 are graphs of the SO<sub>2</sub> annual and maximum 24-hour averages.

Figure 6-7 and 6-8 shows the annual and maximum 1-hour averages of NO<sub>2</sub> compared to the federal NAAQS.

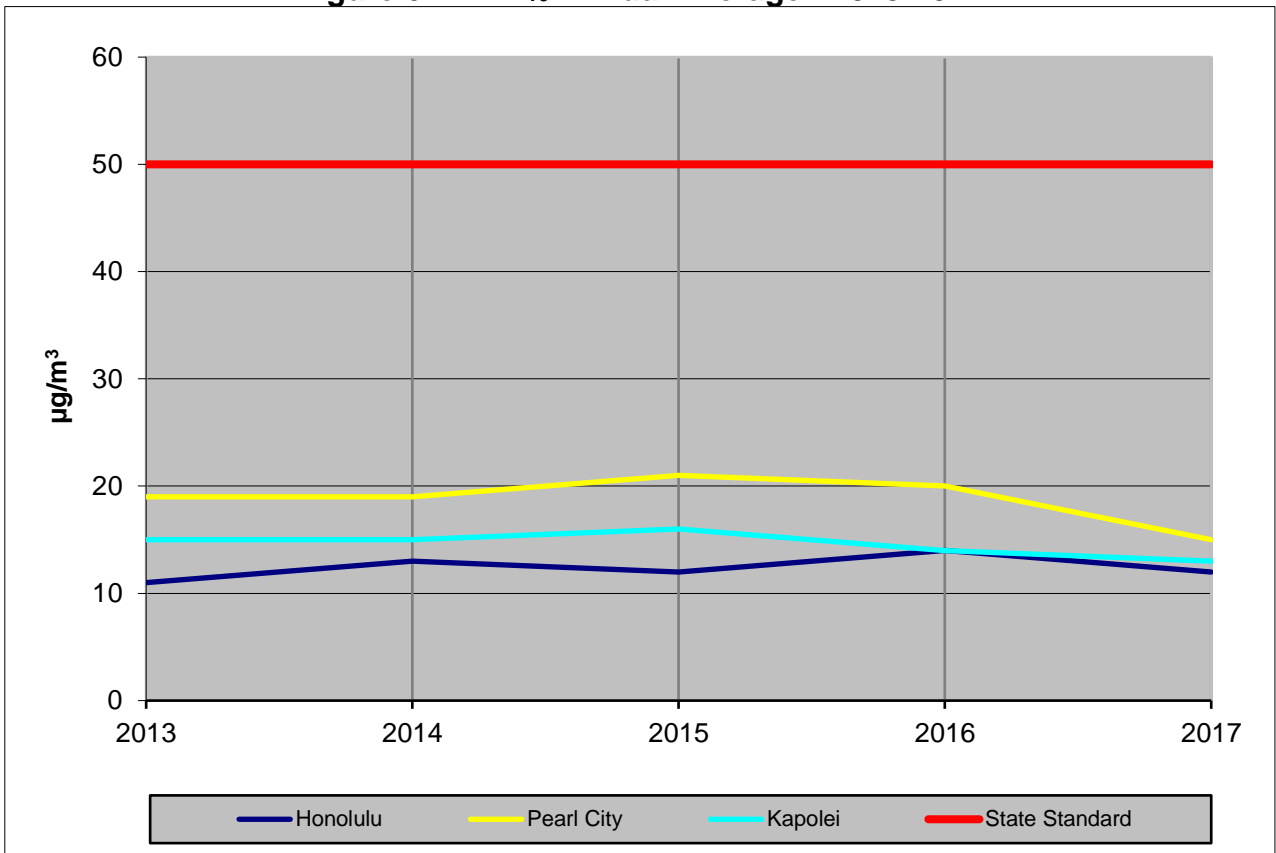
Attainment of the 8-hour ozone standard is achieved by averaging 3 years of the fourth highest daily maximum 8-hour average concentrations, which must not exceed 0.070 ppm (standard effective October 1, 2016). Figure 6-9 is a graph of the fourth highest daily maximum values recorded at the Sand Island and Kapolei (since 2011) ozone monitoring stations in the past five years.

The graphs for 1-hour and 8-hour carbon monoxide (figures 6-10 and 6-11, respectively) represent the maximum 1-hour or 8-hour values recorded in the year.

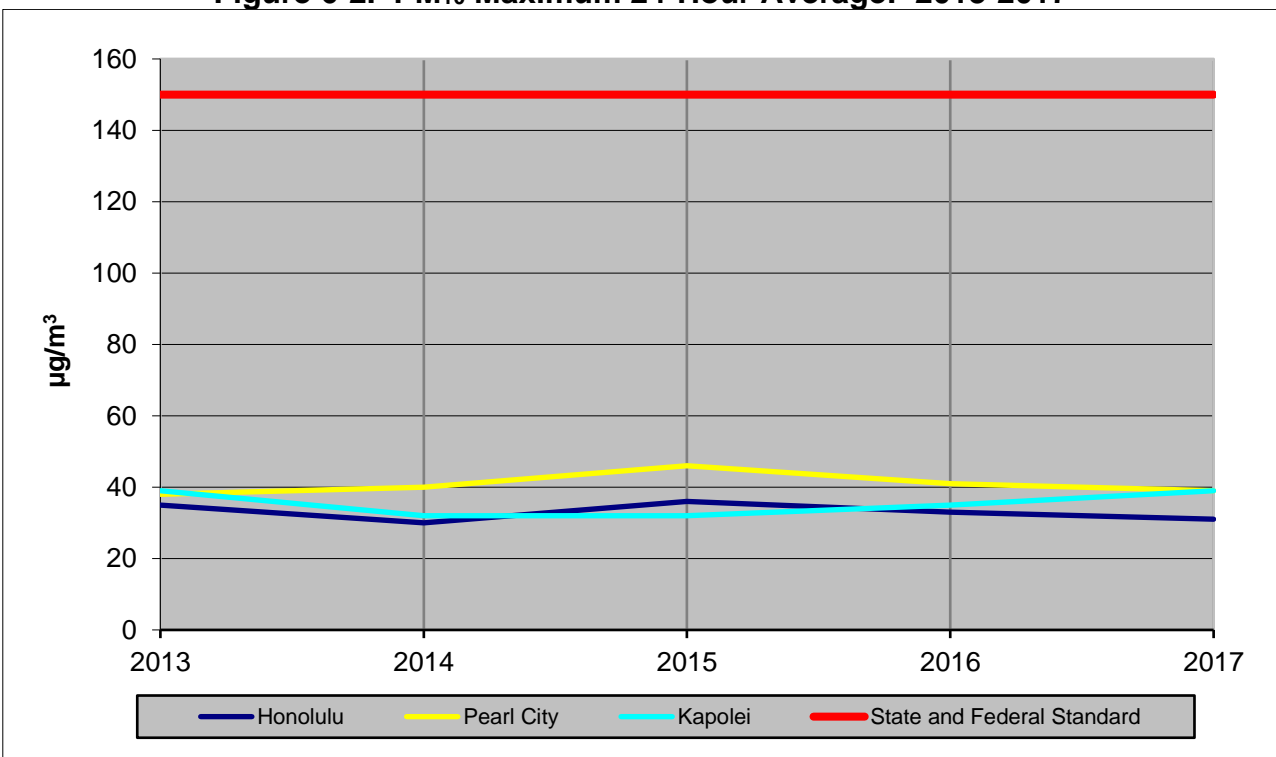
Criteria pollutant levels remain below state and federal ambient air quality standards at all SLAMS stations in the state.



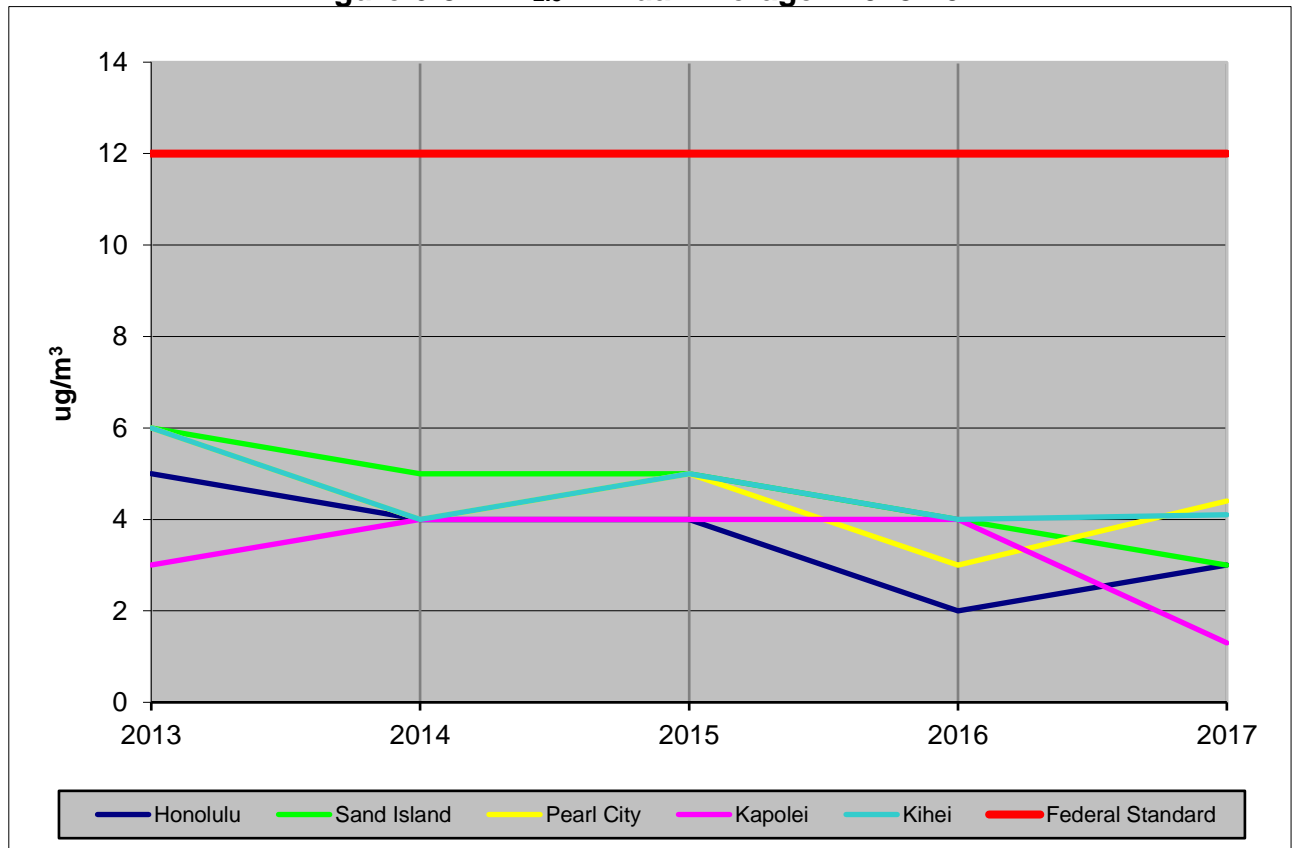
**Figure 6-1. PM<sub>10</sub> Annual Average: 2013-2017**



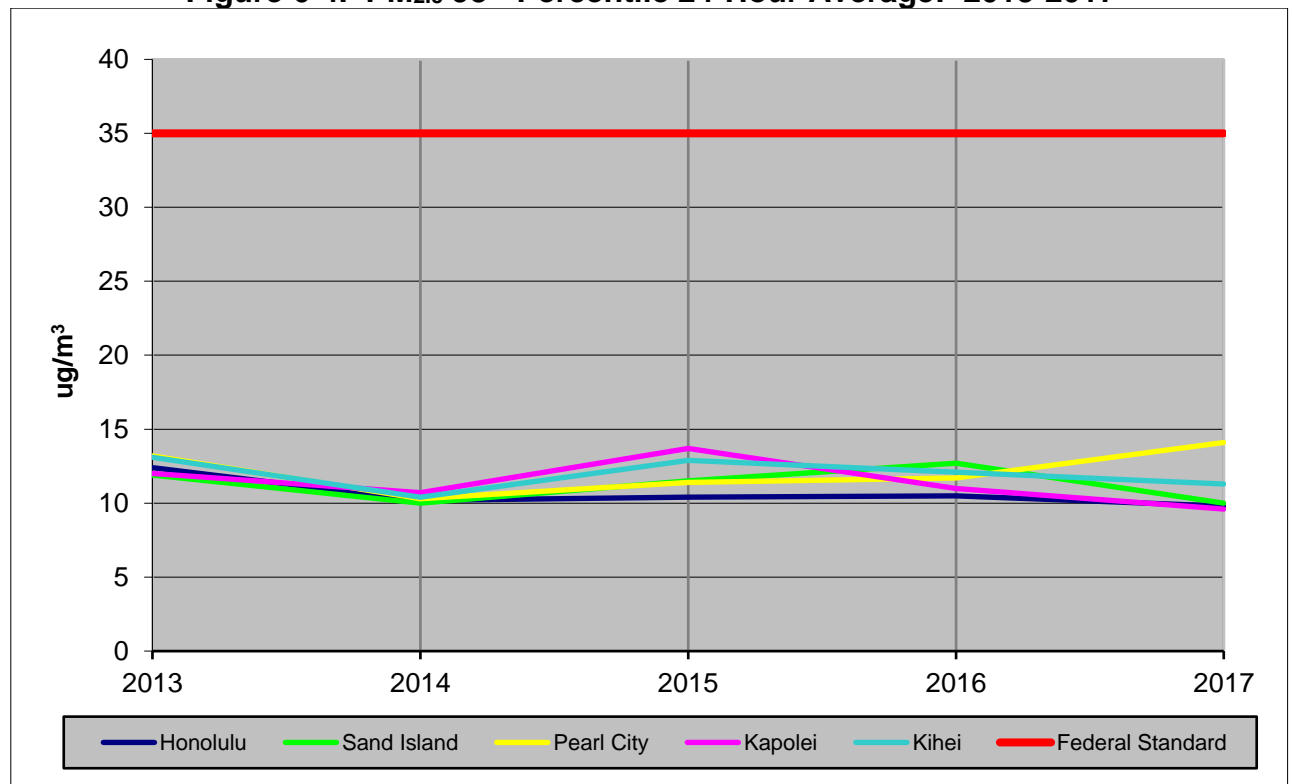
**Figure 6-2. PM<sub>10</sub> Maximum 24-Hour Average: 2013-2017**



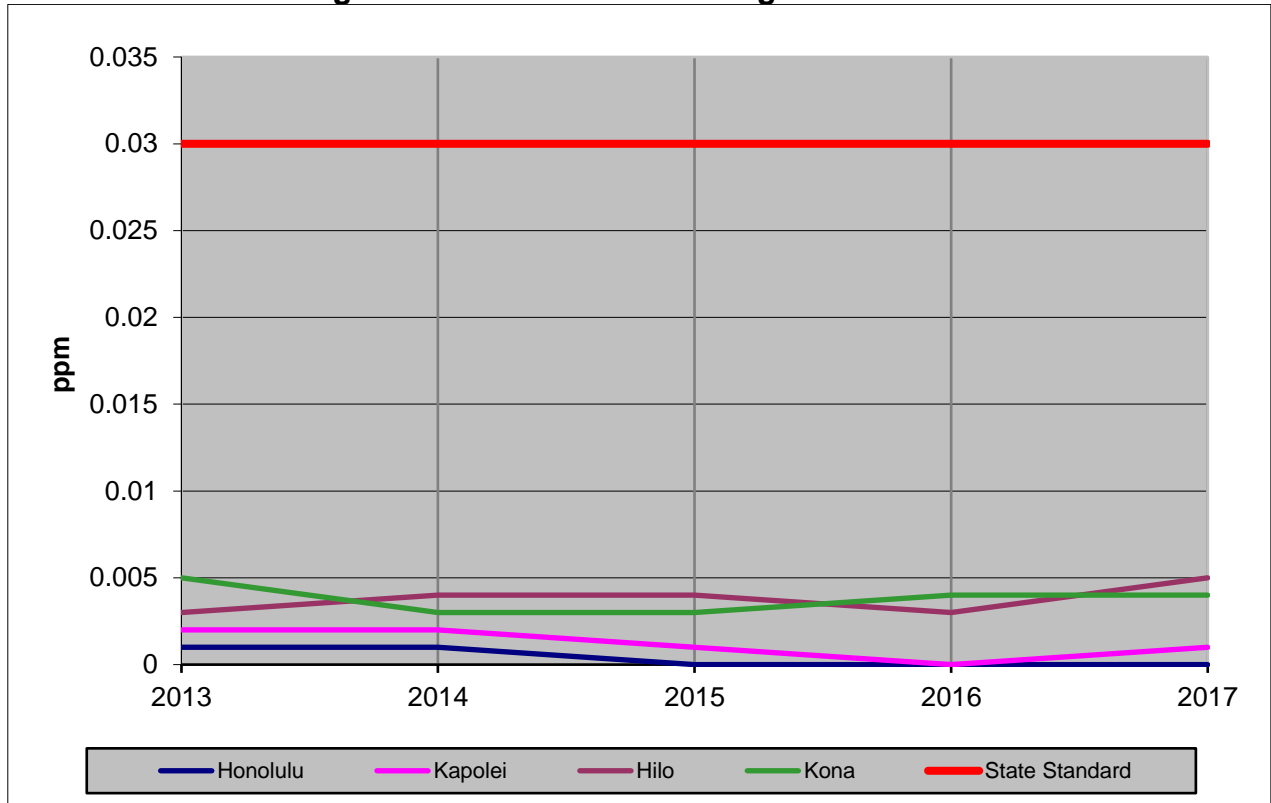
**Figure 6-3. PM<sub>2.5</sub> Annual Average: 2013-2017**



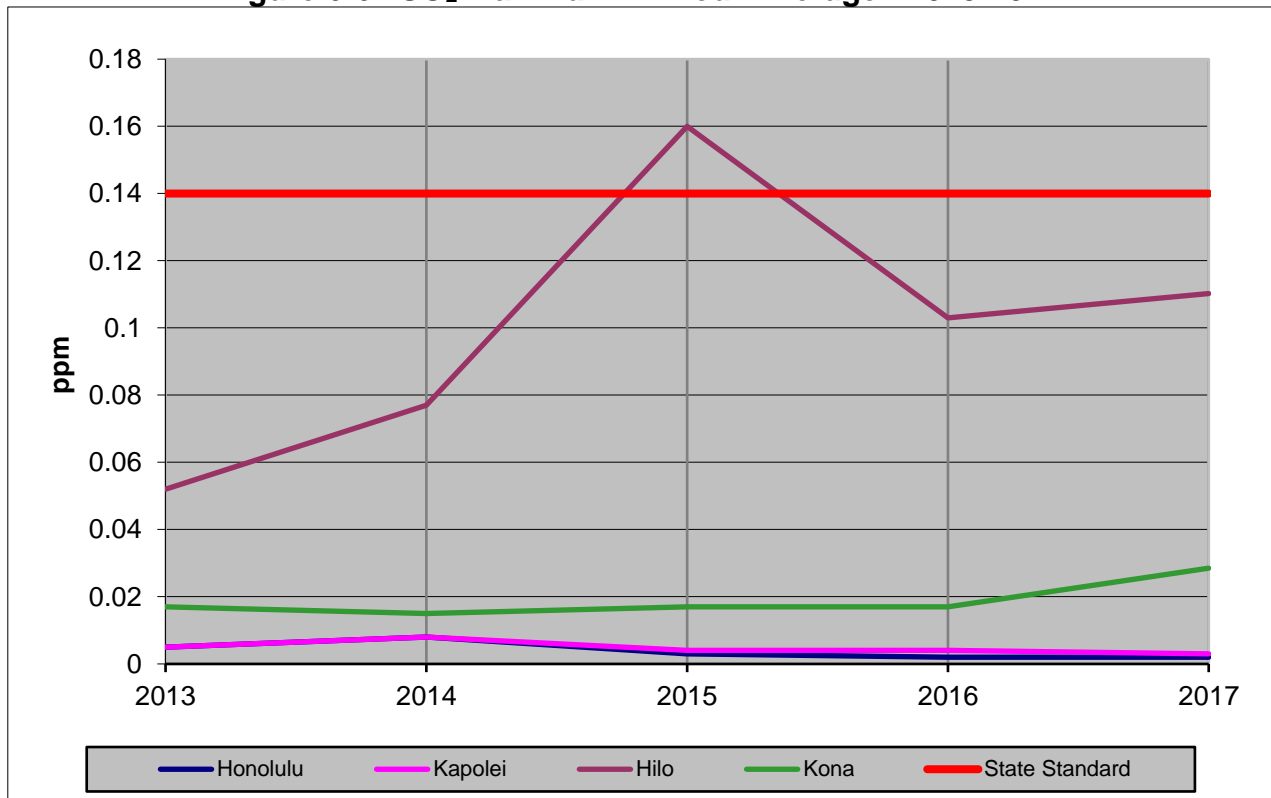
**Figure 6-4. PM<sub>2.5</sub> 98<sup>th</sup> Percentile 24-Hour Average: 2013-2017**



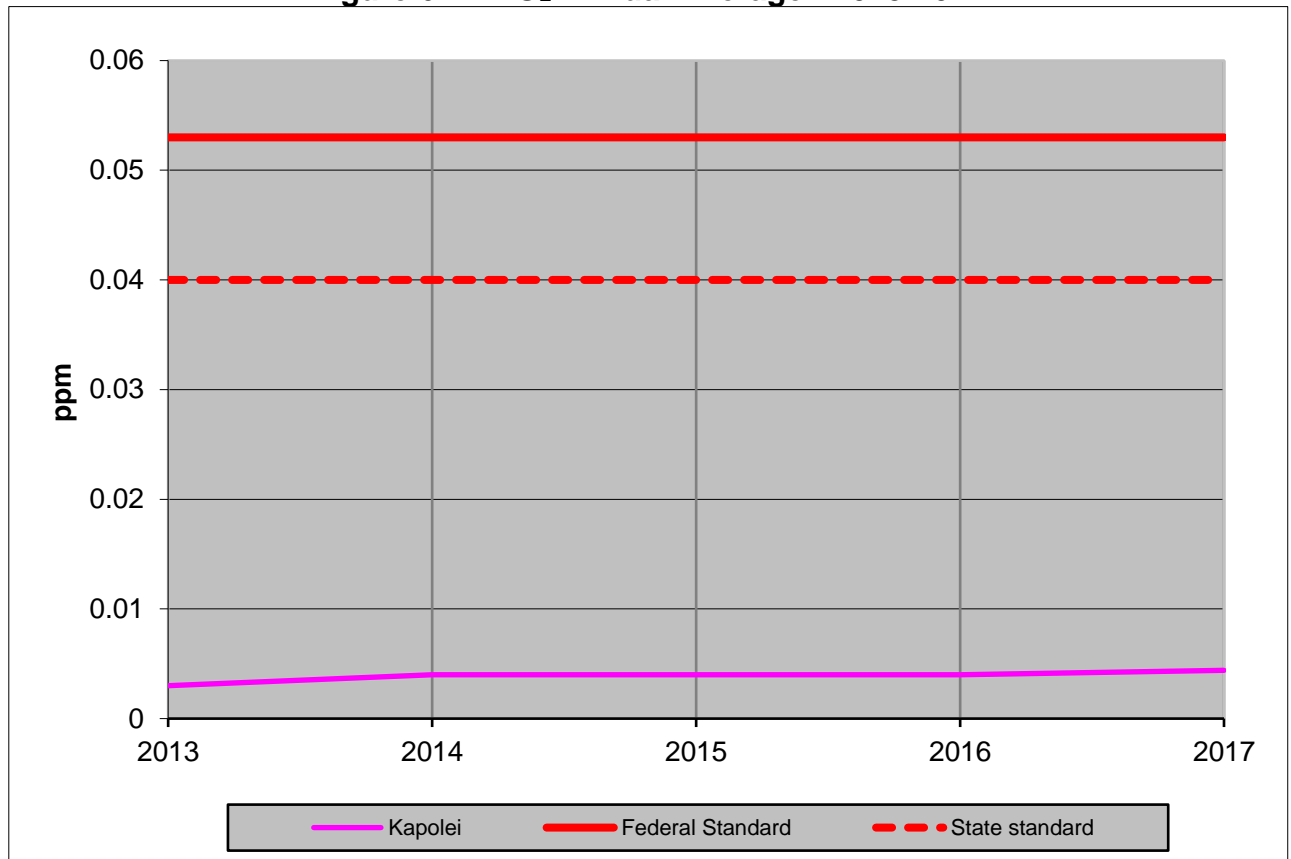
**Figure 6-5. SO<sub>2</sub> Annual Average: 2013-2017**



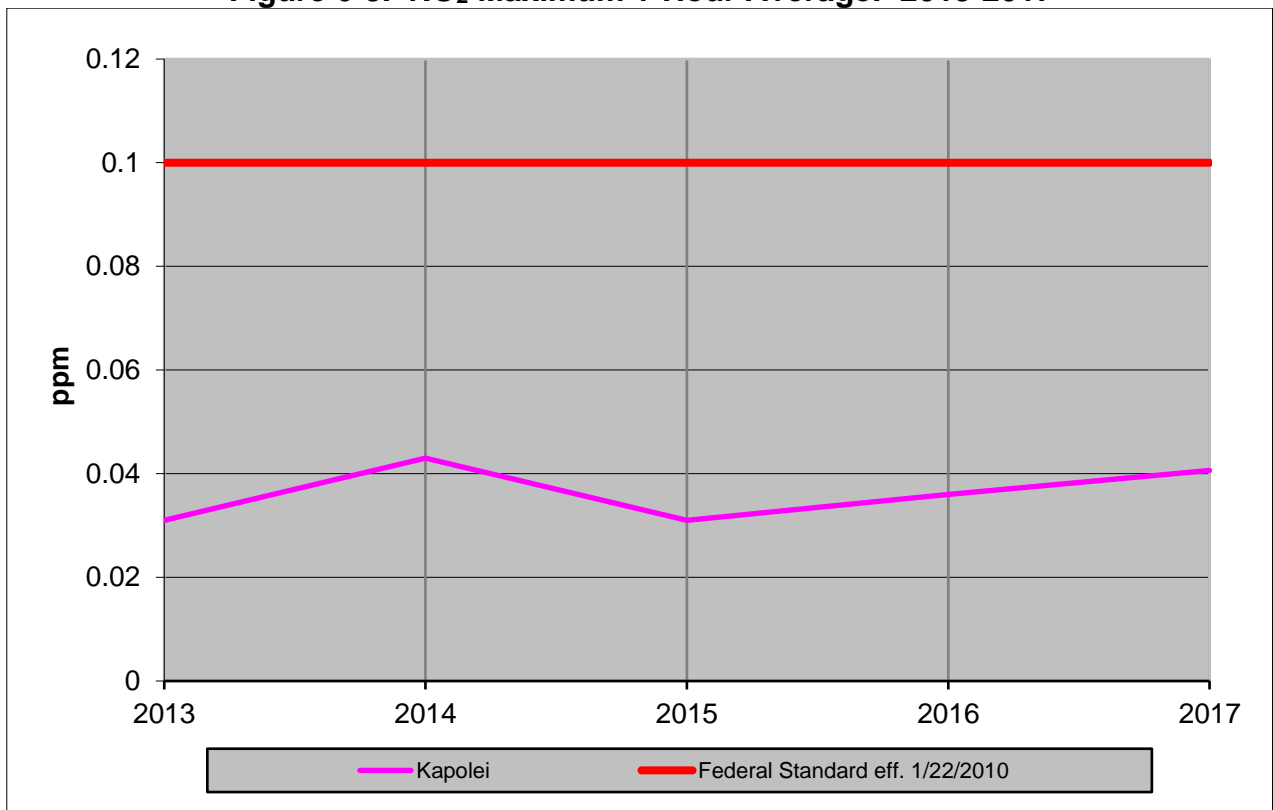
**Figure 6-6. SO<sub>2</sub> Maximum 24-Hour Average: 2013-2017**



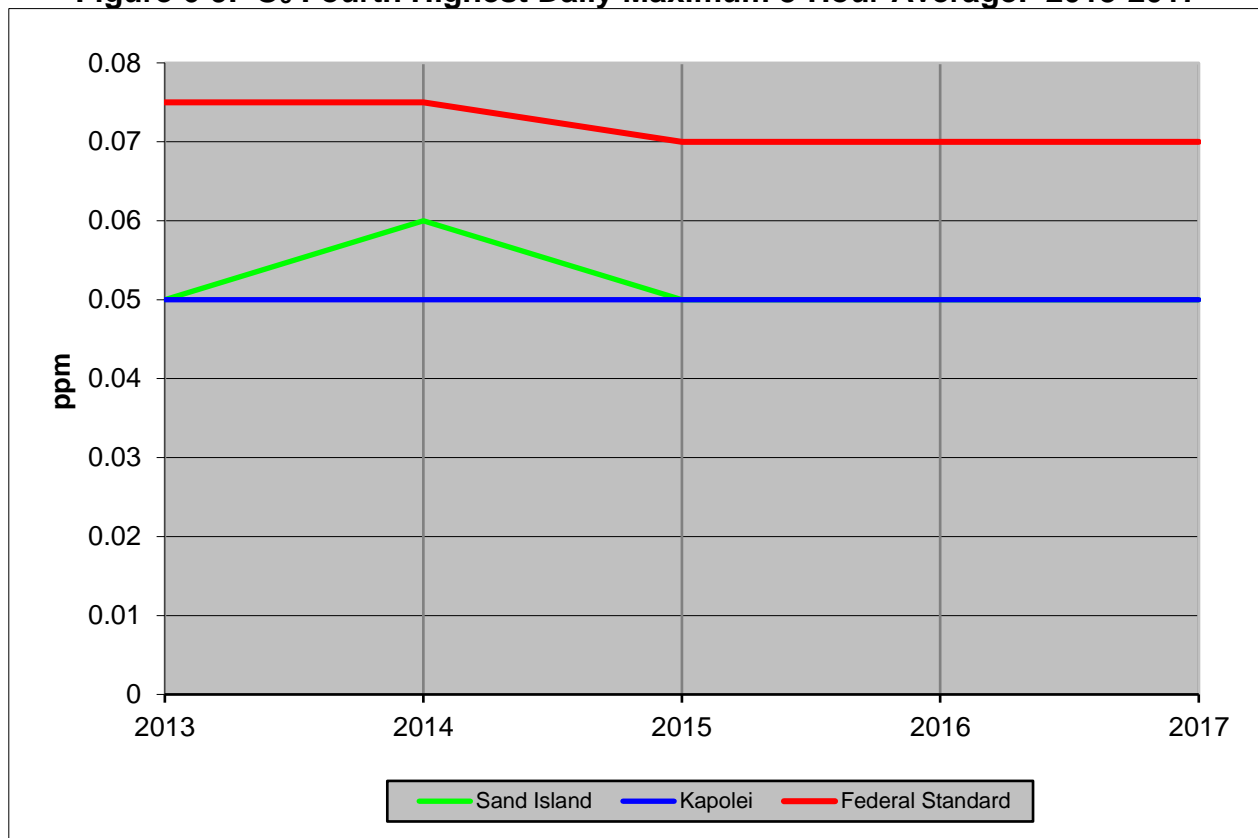
**Figure 6-7. NO<sub>2</sub> Annual Average: 2013-2017**



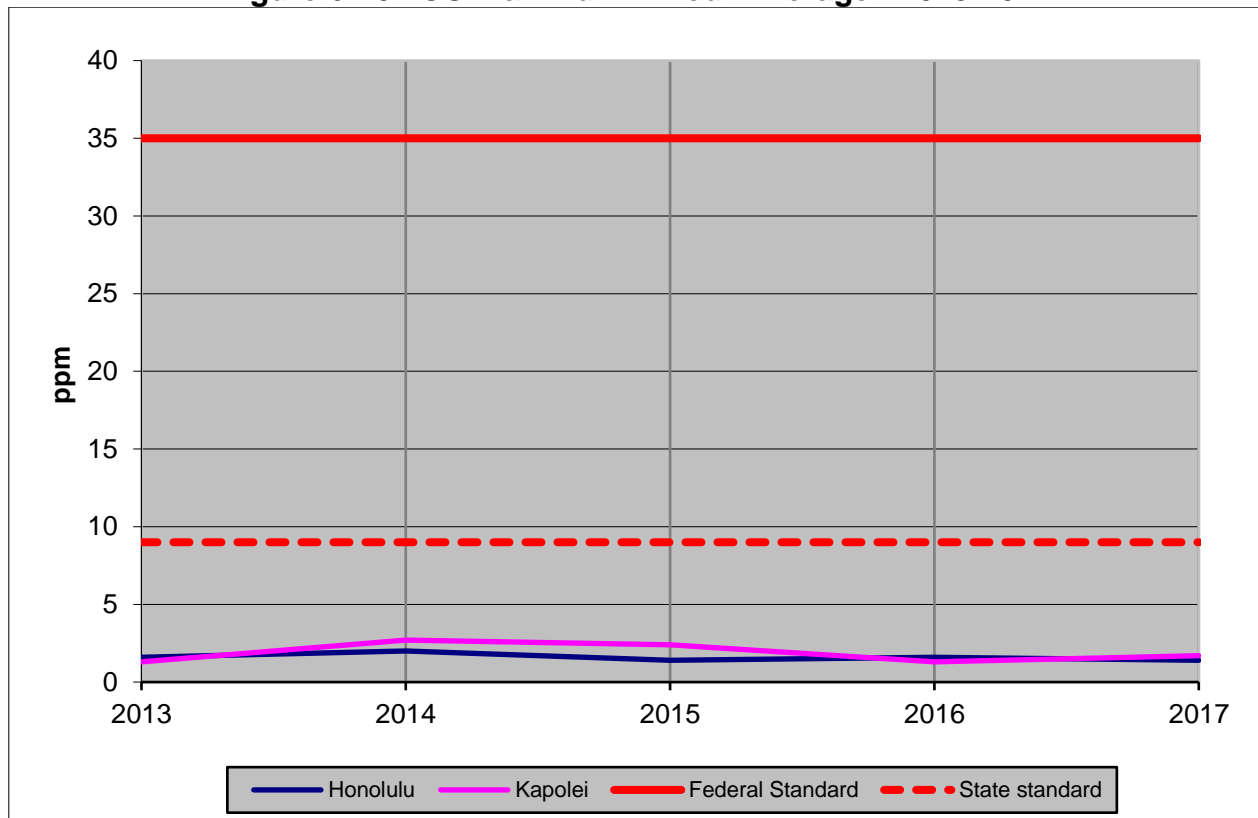
**Figure 6-8. NO<sub>2</sub> Maximum 1-Hour Average: 2013-2017**



**Figure 6-9. O<sub>3</sub> Fourth Highest Daily Maximum 8-Hour Average: 2013-2017**



**Figure 6-10. CO Maximum 1-Hour Average: 2013-2017**



**Figure 6-11. CO Maximum 8-Hour Average: 2013-2017**

